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PRICE 15 CENTS.

SEPTEMBER 29, 1888.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XXIV. REGULAR EDITION NO. 666.

ARCHITECTVRE

ENGINEERING

DECORATION

CONSTRVCTION

TICKNOR & COMPANY

BOSTON MASS.

CONTENTS.

Editorial Summary.
Equestrian Monuments.—VI.
A New Engraving of da Vinci's "Last Supper."
Co-operative Building in this Country.
Mediæval Houses.—IV.
Communications.
Notes and Clippings
Trade Surveys.

ILLUSTRATIONS.

Chapel of the Episcopal Theological School, Cambridge, Mass.
[Gelatine Print issued only with Gelatine and Imperial editions.]
City-hall, Kearney, Neb.
Rindge Industrial School, Cambridge, Mass.
The Tower of London.
Engine-house No. 15, Detroit, Mich.
House at Camden, N. J.
Cemetery Entrance, Philadephia, Pa.

REVIEW OF THE PRINCIPLES OF SANITARY PLUMBING AS NOW ACCEPTED BY ALL LEADING SANITARIANS.

THE main object to be attained is the complete removal of waste matters from the premises the instant they are generated. This can only be accomplished by observing the following rules:—(1.) Avoid all cesspools. (2.) Make all waste-passages as small as possible to effect their purposes. (3.) Construct every fixture on the principle of the flush-tank. (4.) Make every trap seal-retaining and self-scouring. (5.) Make all joints tight. (6.) Select the simplest appliances and the simplest system consistent with safety. These rules are self-evident enough to be accepted as plumbing axioms, and are sufficient to produce perfect work. The "Sanitas" Appliances have been constructed with a view to their fulfilment in every respect, and an examination of the steps leading to the development of these appliances will best illustrate the principles of Sanitary Plumbing, showing the faults which should be avoided, and the objects which should be sought.

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trap answers all our requirements except that it has no power to retain its seal under the variations of atmospheric pressure occuring within the waste-pipes. To remedy this deficiency the pot-trap was developed from the S-trap by simply enlarging its upcast limb, a sufficient enlargement gives it a temporary power of resistance, but creates a cesspool having no self-cleansing power and, accordingly, the trap clogs, under sinks, with

grease and ultimately loses its original resisting power. To avoid this difficulty we have turned the pot-trap on its side and reduced the size of its body. This permits the air to pass through the trap above the water without driving the latter out

before it, as would be the case with a perpendicular body equally reduced in diameter. To still further increase the power of resistance to siphonage the body was next bent into a quadrangle, giving several reflecting surfaces, which throw back this water under siphoning action while they allow the air to escape, and, finally, the two parallel sides of the quadrangle were merged into a single body having a reflecting partition and a large clean-out cap. This gives us the perfected Sanitas-Trap, which

has proved itself to be both anti-siphonic in properly arranged plumbing-work and substantially self-cleansing either with or without venting. It is more resisting than a vented S-trap.

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SANITAS

APPLIANCES

PLUMBING

Considering next the Lavatory. These should always be constructed on the principle of the flush-tank, their discharges filling the water-passages "full-bore," so as to keep them clean. The overflow and outlet passages should be combined in the form of a stand-pipe, thus doing away with the usual foul, inaccessible and badly jointed lead overflow-pipe, and the troublesome and dirty plug and chain. The stand-pipe should be operated by a simple mechanism above the slab, for convenience and cleanliness, requiring but a single movement of the hand, and all parts should be of solid and durable construction, while the stand-pipe should be easily detachable for cleansing. The Sanitas Lavatories are all constructed after this principle, and they are the first ever so constructed. The stand-pipes are made of either plated metal or of earthenware, like the fixture itself, and the whole device produces a very ornamental effect, especially when decorated in colors to correspond with the decoration of the earthenware bowl. Finally, the ideal water-closet should have the simplicity of the short-hopper, with the sanitary advantages and convenience of the improved modern closets. More than this, it should be practically noiseless, anti-siphonic, quick-acting, self-sealing, and free from spattering or waste of water. These desiderata have been attained in the Sanitas Water-Closet of which we sketch the outline in section. The supply-pipe between the cistern and the closet discharges into the latter below the level of its standing water, and being without air-pipe, stands permanently full of water, hence the action is instantaneous and the noise of flushing is deadened. This and the peculiar construction of the flushing-rim and water-supply passages cause the waste to be discharged with wonderful speed and effectiveness; and at the same time so quietly that with the cover down and the toilet-room door closed, no sound of flushing can be heard from without. The closet is highly ornamental in appearance, hence no other wood-work is required than the seat and cover, and these may be supported directly on the earthenware itself, which is constructed with this in view. The Sanitas System, taken together, is the most economical as well as the only safe system of plumbing, as avoiding the dangers and complication of special trap venting. Whether vented or not it is now admitted that safety requires a trap to be *anti-siphonic*, the vent-pipe alone not being reliable. The Sanitas Trap holds sufficient water to resist, when properly set, any *back pressure* that can occur in good plumbing with properly vented soil-pipes. For more detailed description and illustration of the Sanitas Appliances, see our other Advertisements and the Circulars of

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XXIV. Copyright, 1888, by TICKNOR & COMPANY, Boston, Mass. No. 666.

SEPTEMBER 29, 1888.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS.

SUMMARY: —
Report of the Fire-Marshal of the City of Boston. — The "Defective Flue" and other Causes of Fire. — Spontaneous Combustion. — Profit-Sharing as practised by C. A. Pillsbury & Co. — The Workmen's position as to Sharing Losses as well as Profits. — The Congressional Library Scandal. — The Attack on Mr. Stahlnecker, a Member of the Committee on the Library. — Col. Casey to have charge of the Building. . 141
EQUESTRIAN MONUMENTS. — VI. 143
A NEW ENGRAVING OF DA VINCI'S "LAST SUPPER." 145
ILLUSTRATIONS: —
Chapel of the Episcopal Theological School, Cambridge, Mass. — City-hall, Kearney, Neb. — Rindge Industrial School, Cambridge, Mass. — The Tower of London. — Engine-house No. 15, Detroit, Mich. — House at Camden, N. J. — Entrance to the Most Holy Redeemer Cemetery, Philadelphia, Pa. . 146
CO-OPERATIVE BUILDING IN THIS COUNTRY. 146
MEDIÆVAL HOUSES. — IV. 149
COMMUNICATIONS: —
Lead Plates in Masonry. 151
NOTES AND CLIPPINGS. 151
TRADE SURVEYS. 152

MR. CHARLES W. WHITCOMB, the Fire-Marshal of the city of Boston, has just issued his Second Annual Report, which is as interesting as the first one. There is a special value to the observations of an independent expert on matters which are generally studied only in the interest of the insurance companies, and Mr. Whitcomb's statements in regard to incendiarism, and other causes of fire, deserve to be carefully compared with the statistics compiled by the insurance journals. For example, the insurance statistics present incendiarism as the cause of a large proportion of the fires that occur, while spontaneous combustion occupies in them but a comparatively small space. The Boston Fire-Marshal finds, however, that in the city under his charge there were last year more fires from spontaneous combustion than from incendiarism, and only an insignificant percentage of either. The "defective flue," moreover, that arch enemy of the underwriters, which is, we believe, credited in insurance statistics with being the cause of more than half the recorded fires, plays a very small part in Boston conflagrations. In fact, Mr. Whitcomb does not ascribe any fires during the year to this dreaded agency, as commonly understood, but classes together all the cases of fire arising from the ignition of wood furring placed in contact with chimneys, floor-timbers running into or near chimneys, or woodwork exposed to heat from a furnace or stove smoke-pipe placed dangerously near them, under the head of "Defective Construction," and attributes to this about four per cent of the fires of the year.

THE cause to which conflagrations in Boston are most commonly due is, we learn, not the "defective flue," or the machinations of the "incendiarist," but the misuse of matches, which are the source of twenty per cent of the fires. About three-fourths of these come from careless handling of the matches, either by children or by those who ought to know better, and the others are brought about by rats, which carry matches to their nests, and gnaw off the paraffine or paste at the end. It is a little startling to be told that rats playing with matches cause more fires than either defective flues or incendiaries, especially as many experts refuse to believe that rats gnaw matches at all; but Mr. Whitcomb settled this point during the year by putting three rats in a large cage, and placing matches in the cage at night. The floor of the cage was invariably found the next morning to be strewn with partly-burnt matches, and one of the rats actually gnawed the phosphorus end of a match held in the Marshal's hand until it was ignited, so that he considers his opinion as to their destructive ingenuity well founded. Although, as Mr. Whitcomb says, an "autopsy after cremation" is liable to some uncertainty, his method of investigation seems to be searching and accurate, and in certain special classes of cases, such as those due to incendiarism and spontaneous combustion, his observations shed a curious light upon subjects about which very little is accurately known. He acknowledges that the proportion of incendiary fires in the rural districts is far greater than in cities, so that the cases under his own jurisdiction afford only a partial view of the matter, but he has tried to enlarge his knowledge by investigations extended over the State, and has been led to some interesting conclusions. The most important of these is the opinion, which is entirely supported by his evidence, that the "moral hazard" about which insurance officials talk so much is very nearly a myth. An American insurance authority, he tells us, ascribes ninety-nine per cent of incendiary fires to plots to cheat the underwriters by over-insurance, and, in his first report, falling into the prevailing current, he stated that a majority of incendiary fires undoubtedly originated in this way. During the past year, however, finding reason to doubt the truth of even this moderate statement, he sent to the county prosecuting attorneys of New England, to the directors of penal institutions, and others, for information as to the motives which were shown by the evidence in trials for arson to have led to the guilty act. To his surprise, he found that, instead of over-insurance, the motive for the crime, in seventy-five per cent of the cases occurring through a long period of years, was simply a desire for revenge; while, of the remaining twenty-five per cent, about one-third were due to wanton mischievousness, one-third to general depravity, and only the remainder, about one-twelfth of the total number, to a desire to rob the insurance companies. In the cities, however, the proportion of insurance robbers is greater, and Mr. Whitcomb finds in Boston, as has been found in other cities, that a large part of them are Jews of the meaner class, to whom an attempt to insure worthless goods at a high valuation, and then destroy them, often seems a legitimate speculation. Although the honorable and upright Jews coöperate heartily with the authorities in endeavoring to put a stop to these frauds, they continue to be practised, and Mr. Whitcomb says that there are among the speculators men who make a business of setting fires for their over-insured friends, receiving payment by a commission on the amount of insurance collected. These useful individuals work, we are told, with some sort of "volatile chemical," which is to Mr. Whitcomb mysterious, but has the property, when scattered over the premises, of damaging the entire stock, although the fire may be trifling. We suggest that the "mysterious" chemical reminds us very much of a solution of phosphorus in bisulphide of carbon. This solution is very innocent in appearance, is easily scattered over inflammable substances, and produces no visible effect until the carbon bisulphide has evaporated: when this has disappeared, however, the phosphorus left behind begins to smoke, and soon bursts into a flame, together with the combustible object on which it has been sprinkled.

IN regard to spontaneous combustion, the fires of the year in Boston have furnished some new observations, of considerable importance. In one case, a quantity of feather dust in a bedding manufactory took fire without apparent reason. It was found, however, that a piece of thick glass had been lying on the feathers, and the sun's rays, concentrated in some way by the glass, had set fire to them, although the day was a cold one, in the month of March. In another case, a number of tarpaulin hats were lying, packed together, in a window. The high temperature, with, perhaps, the close packing of the hats, caused them to burst into a blaze. Two other fires were caused by putting paraffine paper, such as candy is wrapped in, into a refuse-barrel which contained a little sawdust; and a third, which destroyed twenty thousand dollars' worth of property, was occasioned by putting greasy paper, which had been used to wrap lunches in, into a wooden refuse-barrel, which happened to contain some sawdust and sweepings.

WE have before mentioned the scheme by which Messrs. C. A. Pillsbury & Co., the proprietors of the largest flour mills in the world, proposed some time ago to share their profits annually with their men. The plan was put in operation in 1884, and a considerable sum was divided at the end of the year. The next year was less prosperous, and at the end of it the Messrs. Pillsbury & Co., instead of a dividend, sent out a circular, explaining that there were no profits to

divide; that their own capital had brought in no interest, and their work and care had been totally unrewarded, except by the consciousness that their men had been kept employed, and that no reduction in wages had been made. The next year there was no improvement in the business, and no dividend; but during the fourth year, which is just completed, the profits were large, and the firm has distributed forty thousand dollars among its employés, as their share of them. A flour mill does not require many hands, and the dividends vary, in accordance with the scheme by which they are reckoned, from twenty-five dollars to twenty-five hundred, but none of them are less than a month's wages, and some are very much more. The firm accompanies the dividend checks with a note, pointing out how the men, by trying to diminish the risk of fire, and keeping in mind the conditions of most efficient manufacture, may do still more to increase profits and avert losses, and announces that hereafter losses, as well as profits, will be divided among the men, to the extent that, if the year's business results in a loss, no dividend will be paid until this loss has been made good by subsequent profits.

ALTHOUGH most intelligent workmen, in discussing the profit-sharing systems, willingly accede to the idea that losses should be shared as well as profits, and consider it hardly fair or manly to accept one without helping to bear the other, it may be doubted whether it is wise, in most cases, to take this as a basis for such schemes. We think that the experience of most business men is that, while profits depend upon the slow growth of confidence on the part of customers, and on gradual improvement in processes of manufacture, and economy in administration, losses come most frequently on a large scale, through the folly or bad manners or morals of some one in authority. While the efforts of employés may do a great deal to save unnecessary expenditure, and increase and improve production, and thus make profits larger, they are of no avail against the dishonesty or bad business habits of a partner or confidant of the firm, and those who have done their best to earn profits should not be saddled with any part of the loss, if their superiors do not know how to make their work available. Although there are some profit-sharing establishments where losses are divided as well as profits, without allowing the men any influence in the management of the business, American workmen would not long submit to the reckless administration of a conceited and ignorant junior partner if they thought they were to suffer by it, and sooner or later the sharing of losses with employés would involve the sharing of management with them. We are inclined to think that this would be by no means an unmixed misfortune in manufacturing business, and that a veteran workman, who understands every detail of the manufacture, and has had to count his pennies all his life, and to spend and save with discretion, is likely to be as good an adviser in money matters as the college-bred sprig whose parents have bought him an interest in the firm to keep him out of mischief, or the "Napoleon of finance," whose genius lies principally in the size of the debts he can incur, but this view is not yet popular, and it is safest not to raise the question where it can be avoided.

WE imagine that most of our readers are rather at a loss to understand, from the unintelligible accounts in the daily papers, the exact nature of the charges which have been brought against Representative Stahlnecker, of New York, in connection with the Congressional Library building, and are now under investigation before a committee of Congress. In general, the movement against Mr. Stahlnecker appears to be a manœuvre on the part of the friends of Mr. Smithmeyer, the Library Commission, and the existing state of things, to meet the sudden assault made upon them by the opposing party a few weeks ago, and so far as we can see, the tactics employed appear to be about equally creditable on both sides. It will be remembered that the principal grounds of complaint which the House had against Mr. Smithmeyer, as distinguished from the Library Commission, under whose direction he worked, were that the execution of his design would cost ten million dollars, while the House had been led to suppose it would cost only three million, and that he had refused to use certain cement in the building which he thought was unsuitable, but which several other people thought was suitable. The answer to the first of these accusations was that as the Library building, according to Mr. Smithmeyer's plan, is to be three times as large as the State, War and Navy building, which cost three for our millions, it was obviously absurd to suppose that it could be built for the same price, and the delusion of the House on this point, if it existed, must have arisen from a misunderstanding of the estimate given by Mr. Smithmeyer and the Commission as to the expense of erecting a portion of the structure for temporary use; and the second was met by saying that Mr. Smithmeyer was, by his professional position in connection with the building, the final judge as to the cement to be employed in it, and if he did not consider the cement offered him to be suitable, it was his duty to reject it, no matter how many experts might have testified to its high quality.

THE counter-attack on Mr. Stahlnecker, who, as a member of the Library Committee of the House, probably had something to do with the assault on Mr. Smithmeyer and the Commission, also consists principally in two charges; the first being that he employed undue influence to persuade Mr. Smithmeyer to use for the building marbles from a quarry near his home, in which he or some of his relatives are alleged to be interested; while the second asserts that he also used undue influence to secure the adoption of inferior cement for the foundations. In regard to the first accusation, it appears to be reasonably certain that Mr. Stahlnecker went to the architect, and told him that in his district there was a quarry of marble, called Tuckahoe marble, superior to all others for the purpose of constructing just such buildings as the new library. He subsequently brought the agent of the quarry to Mr. Smithmeyer, and introduced him, and the pair joined in singing the praises of the Tuckahoe stone, and Mr. Stahlnecker strengthened his appeal by inviting the architect to make him a visit at his home near this admirable quarry, and informing him that he was on particularly intimate terms with Secretary Lamar, the Chairman of the Library Commission, and that the selection of the marble in which he was interested would be gratifying to this very influential person. As to the second charge, it seems that Mr. Stahlnecker came to the architect, and advised him "as a friend," and "in his own interest," to accept the cement offered by the contractor, which Mr. Smithmeyer had already rejected. The latter, of course, declined to comply with this advice, and explained to Mr. Stahlnecker that he must insist on having cement which fulfilled the requirements of the specification, and Mr. Stahlnecker departed; and not long afterwards came the startling onslaught in the House on the whole administration of the Library construction. The assertion that Mr. Stahlnecker or members of his family were concerned as owners in the quarry was fully refuted, and any member of Congress may naturally wish to secure a large contract for some of his constituents, so that it is not necessary to impute to him a corrupt motive to explain his importunity. Moreover, we have not seen any report that showed that any attempt had been made on the part of the quarry-owners to secure Mr. Stahlnecker's endeavors in their behalf by paying him a commission or lobbyist's fee. It is evident, however, that the methods of persuasion he did employ were such as to alarm the honorable instincts of Mr. Smithmeyer, who seems to have believed that he was dealing with one of those men who think they can bore or bully professional men into subservience to their schemes.

THE very latest intelligence in regard to the matter is that the Senate and House of Representatives have abandoned their quarrel over Mr. Stahlnecker and the Commission, and have agreed upon conditions of peace, by which Mr. Smithmeyer is to be sacrificed, and the construction of the Library building put under the direction of General Casey, of the United States Engineers. We have the highest admiration for Colonel Casey's ability and ingenuity, but we must confess that we cannot see how his conspicuous skill as an engineer is going to conceal the discreditable confession that the Government of this great country, which boasts some of the best architects and the most beautiful buildings of modern times, cannot get itself served by architects in whom it has any confidence; and, spending scores of millions upon the public architecture, is compelled to entrust its most important building — the most costly and important structure now in progress in the world, to the genius of an army engineer.

EQUESTRIAN MONUMENTS. — VI.[1]

THE DARK AGES.

Odoacer.[2]

GOTH and Vandal are in these days synonyms for thorough-paced barbarians, and they doubtless fully earned their reputations, but they were not all bad nor all mere barbarians. The history of Italy under Odoacer and Theodoric shows that after a period of upheaval and tumult succeeded a season of comparative peace and quietness, and a revival in some measure of the polite arts, strongly flavored with Byzantine influences. Rome at this time was no longer the home of the alien rulers: their rugged natures demanded a more bracing atmosphere and found it at Ravenna, which in time became a rival in no small degree of the city on the Bosphorus. Odoacer was a mere military leader, to be sure, but he was a successful one, and the Roman practice of honoring such men with monuments had not become wholly obsolete in the peninsula, so that it is not surprising

Bronze Statuette of Charlemagne.[3]

that a people accustomed to being surrounded by works of art should, when peace was restored, on looking round and finding that the invaders had destroyed the familiar monuments of earlier days, seek to do something to replace them so far as their unaccustomed hands might do, and what more natural than to seek to curry favor with the despot by erecting a monument in his honor?

The accompanying cut from the "*Papiæ Sanctuarium*" (1505), by Jacobus Gualla, represents the so-called "Regisol" erected at Pavia upon a column or columnar pedestal of brick. To be sure, some authorities call it a Lucius Verus, others a Marcus Aurelius, others an Antoninus Pius, and again others an Odoacer, and for our purposes we prefer to accept this last supposition. At all events, the statue stood at Pavia until 1315, when it was torn down by the Milanese who had captured the city, broken in pieces and, seemingly, carried off as a trophy. The Pavians, however, duly appreciated this venerable landmark, and taking up a subscription succeeded, in 1335, in ransoming the fragments of the gentleman who had himself done so much damage to works of art, and patching the pieces together regilded the whole and set it up once more on its former pedestal where it remained until 1785, when it was temporarily dismounted and then restored to a new pedestal. It would have been still in existence had not the fates sent a new horde of modern Vandals into Italy — the French, who effectually destroyed the monument in 1796.

The identity of the equestrian statue of Theodoric, the Ostrogoth, that was originally erected at Ravenna, rests on somewhat better authority, for it is first mentioned by the Presbyter Agnellus in church records written about 838, about the time it was removed and carried off to Aix la Chapelle, where Charlemagne was building a magnificent palace into which were wrought all manner of columns and sculptures brought from Italy. It is supposed that Charlemagne, when he passed through Ravenna, after having been crowned by the Pope at Rome, was impressed by the beauty of this statue, and when he felt a need for something of the kind sent especially to Ravenna for it. As the Gothic king is described as wearing a shield on his left arm and brandishing a spear in his right hand, the statue evidently did not belong to the strictly Classic school, but seems to indicate that art had taken a new departure in the direction of realism.

It is not known just when this monument was destroyed, but it is thought that it did not long survive its removal to Aix, possibly falling a victim in the same century to the bigotry of the Catholics, who, perhaps, vented on the statue their distaste for the Arian doctrines upheld by Theodoric, notwithstanding that during his rule in Italy he did not meddle with the Romish Church and its practices. In support of this possibility may be cited a poem, a panegyric on Louis the Pious, the successor of Charlemagne, by Walafrid

Philippe le Bel, in the Choir of Notre Dame, Paris.[4]

Frabo, a monk, in the course of which the poet expresses the belief that this monument to an Arian was the work of the devil.

During the Dark Ages, when the Christian world was preparing for the final cataclysm, on the sufficient-for-the-day-is-the-evil-thereof principle, little heed was taken for the care and preservation of statues and still less for the production of new ones, so though the period between the fall of the Roman Empire and the dawning of the Renaissance was one which probably witnessed the disappearance of many a piece of sculpture[5] that would have added interest to this inquiry, we probably have to mourn the loss of few created within this time.

Whether or no during this debasing and filibustering period the peaceful arts had outside of the cloister any practitioners, and these any clients who cared to encourage them by entrusting to them commissions for large works of sculpture, it is certain that the Church kept the arts alive if others did not, and amongst the works of the

[1] Continued from No. 664, page 126.
[2] From *Jahrbucher für Kunstwissenschaft.*
[3] From the *Gazette des Beaux Arts.*
[4] From *La Croix's* "*Mœurs, Usages et Costumes au Moyen Age.*"
[5] THE DISAPPEARANCE OF POST-ROMAN SCULPTURE. — "As M. Juste Labârte so justly remarks: 'In the European museums there exist no works of the sculptor that have been attributed to this fair epoch of Byzantine art. Nevertheless it *does not seem possible* that of the immense number of statues cut under the rule of the successors of Constantine not one should have survived to us. One is tempted to believe that some of the works that have been preserved from destruction are assumed to be works anterior to the decadence of arts.'" — "*Histoire des Sculpteurs Français,*" *par Marquet de Vasselot*, 1888.

churchmen must be sought the connecting links that unite the art-works of the Roman Empire with the works of the early Renaissance; and in the illuminated missals may be traced the continuance of the traditions that later found expression in the mosaics at Ravenna, and the crude sculptured work of early ecclesiastical buildings where the horse and rider were introduced, as in the sculptures about the doorway of St. Zeno, at Verona, where, on the right, is illustrated the chase of King Theodoric, a subject of some importance, for here, first, according to Maffei, a horseman is shown riding in stirrups. If, then, there were carvers capable of fashioning such work as this, there may have been others who did better and larger work at the same period, or even before.

The relics that in chronological order naturally next attract attention are to be sought in the ethnological museums of France, which have made a specialty of collecting Gallo-Roman remains; and though it is difficult to fix precise dates, probably many of the finds date from a period somewhat subsequent to the Roman domination. Amongst these are to be noted the rudely sculptured *stèles* which bear, after true Classic manner, the figure of the horse, the sepulchral emblem of the departing soul. Then, too, are to be noted amongst the household gods which the peasantry cherished, it is said, invariably, each hut having a niche or cupboard in which the tutelary deity was bestowed, certain mounted figures such as that shown in the annexed cut which represents the goddess of Agriculture or Abundance, which, from its distinctly Roman type, cannot be of very late date, and is credited to the fourth century.

The Goddess of Abundance.[1]

The thoroughness of the Roman civilization in the north of Europe, which is attested by the magnificence of the ruins of villas which are so frequently identified and uncovered in these days, is also proved by the vogue which the practices of the Roman religion also obtained, for relics that clearly show the impress of Classic myth are quite as common as Druidic remains, which they superseded in a measure. In the rude fragment, which is known as the Hercules of the Vosges, is a proof of the adoption of some obscure and possibly local myth which unites Hercules and the horse, here shown trampling on a human figure which terminates with a serpent's tail.

Hercules des Vosges.[2]

This trampling of a rider over a prostrate foe is common to sculpture of all times and peoples. The statues of Justinian, trampling on a Persian, and Probus riding down a figure of the Rhine, have been mentioned, and similar episodes are recorded in the bas-reliefs of Assyria and Egypt, but in no place is this incident more frequently introduced than in the carvings of churches of the eleventh and twelfth centuries, as at St. Etienne-le-Vieux at Caen, Sainte Croix at Bordeaux, St. Pierre, Aulnay, and at Autun, Parthenay-le-Vieux and elsewhere. Explanations of this symbol are as varied as there are instances. Now, it is St. George, St. Martin, or St. Michael; now, it is Pepin-le-Bref riding down Waifre, duke of Aquitaine; now, it is Charlemagne; and now the angel driving Heliodorus from the temple. But, perhaps, the most generally applicable interpretation is, that it represents the terrible rider of the Apocalypse with his dread white horse. But between these sculptures and those of Gallo-Roman times, lie centuries of whose work little is known, and less is left.

Cathedral Capitol.[3]

Perhaps the earliest equestrian statues of the Mediæval period which is known, and which, fortunately, still remains to us, is a bronze statuette of Charlemagne, now in the Musée de l'Hôtel Carnavalet, at Paris, and which is credited to the ninth century, and furnishes proof that secular sculpture was not wholly neglected; though it seems as if it could not have flourished with much luxuriance, since, in honor of the greatest potentate of his time, it seemingly could only produce this crude and miniature presentation. Of the early history of this statuette nothing is known, but Alphonse Vetault, who, in his "*Charlemagne*,"[4] credits it to the ninth century, gives some facts concerning its modern history. It was at one time preserved in the Cathedral at Metz, and later fell in some way into the possession of M. Albert Lenoir, and later formed part of an English collection, but finally was purchased by the City of Paris. After the Commune it was, in June, 1871, picked out of the ashes of the Hôtel-de-Ville, and, fortunately, was seen by some one who recognized it, so that it fell once more into the hands of the proper authorities, who, on the formation of the collections at the Hôtel Carnavalet, placed it there.

The general collapse of art during the ninth and tenth century[5] for one thing and for another, the fact that Charlemagne could not find any one sufficiently skillful to engrave for him a seal of state, so that he habitually used a seal engraved with a head of Marcus Aurelius, or another which bore the head of a bearded Jupiter, seem to make it doubtful whether it is possible that this statuette really is as early as the critics try to maintain.

But art does not proceed by great jumps and bounds; effort and struggle, trial and experiment, and opportunity, and practice are needed for its development, and between this work of the ninth century and the next early work of which, though now destroyed, there is good record, there must be many steps which have left no trace. Until 1772, there stood in the choir of Nôtre Dame, Paris, an equestrian statue of Philippe le Bel, eleventh ruler of the House of Capet, who caused its erection, it is said, in fulfilment of a vow such as were so often made in those times by persons who, in a moment of bodily peril, vowed that, should they have safe deliverance out of their ill-plight, they would go on a pilgrimage to the shrine of Saint This, or bestow a silver candlestick upon Saint That; and as the story goes that this statue showed the king clad as when he repulsed the last attack of the burghers of Ghent and Bruges, that is, armed only with helmet, gauntlets, sword and shield, but without coat-of-mail or greaves, it looks as if he had been nearly the victim of one of the night attacks the stalwart citizen-soldiers were so fond of making, and being in sore straits vowed he would erect a statue in honor of Our Lady —— and to his own glory. The legend has it that on reaching Paris, he, still half-armed, rode his horse into the Church of Nôtre Dame, and there rendered up thanks for his escape, and in further token of his gratitude granted an annual allowance of one hundred pounds for the celebration of the anniversary of the event, and gave orders for the erection of his statue. A Latin inscription on the pedestal vouched for the truth of this legend and the scantiness of the King's armor; but a wood-cut published in 1575 gives the lie to both one and the other, for it shows the King in full armor, but without sword or shield, while horse and rider are quite obscured by the embroidered surcoat and caparison of holiday full-dress.

Philippe de Valois, in the Choir of Notre Dame, Paris.[6]

But the same story is told of a later ruler, Philippe de Valois, who made the vow at the battle of Cassel, in 1328, and caused the erection of the statue. Of this statue, also, there exists an early print, here reproduced, which in some ways seems most

[1] After Du Cleuziou's "*L'Art National*."
[2] After Ménard's "*L'Art en Alsace-Lorraine*."
[3] After Du Cleuziou's "*L'Art National*."
[4] Published at Tours in 1877.
[5] "Nous trouvons une lacune dans l'histoire de l'art pendent les IXme et Xme siècles"—"*Historie des Sculpteurs Français*," *par Marquet de Vasselot*, 1888.
[6] From "*Paris à travers les Ages*," *by M. F. Hoffbauer*.

deserving of belief. At any rate, this cut agrees most closely with the printed description of the statue. Replicas of this statue were also placed in the Cathedrals of Sens and Chartres.

VOWS. — "In the life of San Gallo we read that, in the time of King Pepin, a certain Willimar, being ill, promised, if cured, to offer a horse to the Church of San Gallo. Having recovered his health, he forgot his promise, but passing one day before the church of the saint, his horse stopped before the gate and by no possibility could it be induced to move on till Willimar had at last declared his intention of fulfilling his vow. In the life of St. Martin there is a rather gayer variation of the same anecdote. King Clodoveus, after having become a Christian, when fighting against the Visigoths, promises his own horse to St. Martin if he grants the victory to him. Having obtained it, Clodoveus regrets being obliged to deprive himself of his good charger and beseeches St. Martin to be kind enough to take money instead, offering him a hundred pieces of gold. St. Martin thinks the sum insufficient and asks for double, which Clodoveus gives, but, inasmuch as a little heretic blood still runs in his veins he cannot refrain from aiming a pointed witticism at him: '*Martinus, quantum video, auxiliator facilis, sed mercator difficilis.*'" —"*Zoological Mythology*," *by Angelo de Gubernatis.*

ODOACER, commonly called King of the Herull. He was the son of a minister to Attila, the Hun, and in his youth went to Italy and rose to a high command. When Romulus Augustulus became emperor, the barbarian mercenaries demanded as a reward of their services one-third of the Italian territory, and on this being refused revolted, with Odoacer at their head, and after a short struggle compelled Romulus — the last of the emperors — to abdicate in 476 A. D. Although only a military commander, Odoacer governed Italy with full power, very justly and, in the main, peaceably until compelled to resist the inroads of the Ostrogoths under Theodoric in 489. Unable to oppose him in the field, he retired to Ravenna and there stood a siege of three years, finally surrendering only on condition that he should rule the country in conjunction with Theodoric. The promise was made only to be broken, for in a few days after the surrender Odoacer was murdered and his troops massacred.

THEODORIC, king of the Ostrogoths (455-526); sent as a child a hostage to Constantinople and educated at the court till eighteen years of age and then returned to his father. Becoming king in 475, he was for years the ally of Zeno the Isaurian, until the latter failed to keep his promises and war ensued, Theodoric ravaging the Byzantine territories at different times till at length he marched to attack Constantinople. Then the crafty Zeno pointed out how much better it would be to attack Odoacer and obtain the Western Empire for himself. Theodoric accepted the suggestion and marched with 200,000 men upon Italy and finally captured Odoacer at Ravenna in 493. Thanks to his training in boyhood he appreciated the arts of peace, and under him the country prospered in its internal and foreign relations.

PHILIPPE LE BEL, eleventh king of the House of Capet (1268-1314). Secures by diplomatic trickery the surrender of the English holdings in Guienne in 1292, which he held until 1303. Because of the alliance between England and Flanders, he engages in a series of struggles with the Flemings, which continue till 1305, when the independence of Flanders is practically acknowledged. Engages in a contention with Pope Boniface VIII and his successors and finally accomplishes the removal of the seat of papal government to Avignon. He also accomplishes the dissolution of the order of Knights Templar and the confiscation of their property. His death is said to be due to the summons of the Grand Master Jaques de Molay, whom he burned at the stake, who cited him to appear, with the pope, before the judgment seat of God within forty days. Both pope and king died within the time named.

PHILIPPE DE VALOIS, fifteenth king of the House of Capet, 1293-1350. Raised to the throne through the action of the Salic law, which excluded the daughter of Charles the Fair. In consequence of the aid he gave Robert Bruce, King of Scotland, he became involved in wars with Edward III of England, who laid claim to the throne of France, and, making allies of the Flemings, carried war into France, defeating the French at Crecy in 1346. As an offset to his losses to the English he gained the province of Dauphiné. Married Blanche of Navarre in 1350.

CHARLEMAGNE, 742-814. Crowned emperor at Rome by Leo III, December 25, 800.

[To be continued.]

A NEW ENGRAVING OF DA VINCI'S LAST SUPPER.

Arab Tomb, after "*Les Arts méconnus.*"

THE first copies of Stang's engraving of the "Last Supper," which is on exhibition in the artist's atelier in Amsterdam, are being eagerly bidden for by collectors. M. Gaillard, who worked in competition with Professor Stang, died last year, so that the engraving adds the advantage of an undivided field of attention to its interesting claims as a work of very unusual worth. Comments upon it run too high and stormy as yet to tell where the final judgment concerning it will rest. That it is a noteworthy production is not disputed.

The print has brought up the subject of Leonardo's painting and the history of its decay. The want of data for the latter explains perhaps the insistence on the old and by no means verified story of the French troops, at the end of the last century, having used the refectory of S. Maria delle Grazie, on the wall of which the "Last Supper" is painted, as a stable for horses. Yet, how the picture, which is so high up that its lower edge is on a line with the cornice of a door, could be injured by animals standing below is incomprehensible. No accusation has been made that racks were built. Nothing touched the painting; no hay or straw scratched against it; it was too high to be spattered by effluvia. The only harm possible to accrue to it was from dust and the exhalation of the animals. That these must have been injurious elements is readily granted, but the indignation felt against the French must be modified by the reflection that the place is given over at all times to dampness, and it remains to be proved whether chemical disintegration of the painting follows more rapidly in the presence of animal transpiration than from the smoke and gas of tapers, the steam of hot viands, and from the other influences to which the picture was destined to be constantly exposed, as a decoration of a crowded dining-hall. The French occupation of Milan, moreover, was brief, so brief as to be ridiculous when compared, so far as injury to the painting is concerned, to the four centuries of dampness and time that has been silently but incessantly ravaging it. The incident can be legitimately mentioned, but it is folly to place too great an emphasis upon it. The painting in the beginning was an experiment, done in oil and not *al fresco*, so that it held in itself the elements of early decay. Vasari and Lomazzo both describe it as being, even in the middle of the sixteenth century, lamentably wasted. Since the beginning of our times the utmost care has been taken for its preservation, but all that piety has had for a century to preserve is a blotched and ghost-like vision. Not even the little that is still visible is all Da Vinci's; much is but the ancient and faded over-painting of his work.

So widely spread as engravings of the "Last Supper" are — more widely it is safe to say than any work of art in the Christian civilized world — not one is a production made direct from the wall as Da Vinci painted it. This, at least, is the opinion of careful critics. The finest and best-known engraving, that of Raphael Morghen, is known to have been completed after a copy of the painting by Marco d'Oggionne. That Professor Stang, at this late day, could engrave on the spot from the original painting alone was naturally sheer out of the question. His plan had to embrace an extensive study and comparison of materials in other places besides at Milan, for, after preserving, in accordance with the idea he started out on, what is possible to be yet discerned in the original wall-painting, there was yet to be gathered what is lacking from Da Vinci's sketches for the picture, and of supplying, when these means were exhausted, that which still remained wanting, by restorations of his own in the spirit and the style of the master. His reputation, fortunately, was already become so great as the engraver of "Lo Sposalizio," that he secured the facilities which were needed for his attempt. The municipality of Milan built the required scaffolds and set no limits to his examination of the substance of the wall, to his experiments for getting back of the over-painting to the ground, to his photographing of sections and use of lights; while he was favored by the Grand Duchess of Weimar, who considered the undertaking to be at last a rare promise of historic importance, and for the first time caused the drawings in her collection to be surrendered for use, and by the directors of the public museums in Venice, London and Vienna.

The original material for study consists of heads drawn by Leonardo for his painting, hands and feet, and sketches of the composition of the whole or portions. Of these the most important are the pastel drawings at Weimar, which include the studies of the heads of all but Christ and two of the disciples, all in good preservation and of more value than their common reputation, which was founded, not on the original drawing, but on bad photographs and prints of the drawings. The missing head of Christ exists as a red-pencil sketch in the Brera at Milan. The studies for Simon and Thaddeus have always been reported as being in an English collection. Professor Stang, however, exploded this tale. The drawings are not in England and he had to copy after Marco d'Oggionne in this particular like Morghen before him.

Besides the known studies for the hands and feet of the apostles in London, Venice and elsewhere, Stang had the fortune to identify three drawings, marked as "Of the Lombard School" that hang in the committee-room of the Academy in Venice, as original sketches by Leonardo for the "Last Supper." In the same collection and marked with the same unassumingness "After Leonardo Da Vinci's School," is one of the drawings which has been held to be an original by Leonardo for the composition of his wall-painting. It is in red pencil, shows St. John as letting his head fall completely to the table, and Judas, according to the old tradition, as sitting at the opposite side of the board from Christ. The deviations from the finished picture are striking; they can hardly be considered proofs, however, against the sketch being one of Leonardo's early conceptions. The expression of passion is so natural, direct and powerful throughout the composition, and to such an unsurpassable degree in John's sinking together, that some critics have always been inclined to consider the drawing the master's own, and in recent years there has been added as a weight in favor of its genuineness, the identification by experts of certain letters in the names of the apostles found written over their heads, with the same letters occurring in Da Vinci's handwriting. The Louvre study has never been questioned. It is held to be a leaf from a sketch-book. That Leonardo always carried such a book with him is known and this sketch it is reasonable to regard as a study from nature, taken while the artist was going about seeking ideas as to the composition of his picture. A table is denoted in it by two hasty horizontal lines. Of the group of men sitting about it, one, with legs crossed, leans his head upon his hand and listens devotedly to his neighbor. The latter points with his finger to the farthest end of the board at a man who, to hear better, leans forward over it. The connection of the scene — which, perhaps, took place in a tavern — with the thought in Leonardo's mind, is shown by a sketch of a head of Christ in a corner of the same leaf.

After these scattered studies had been copied and compared, there remained the necessity of selection and even of restoration. Da Vinci drew, for instance, several faces, like those of Christ and St. Matthew, without beards. He added these for the first time in

the painting and here they are faint or wholly erased. Of the right hand of Judas and the left hand of James the Elder, several sketches exist, each a little different from all the others. But it is impossible to record the countless small points of difficult decision that came up. Several important and new discoveries were made by Stang that need to be noted.

The first of these is the fact that, contrary to what Morghen's and all subsequent prints exhibit, the back-ground of the original painting was light. Instead of the eye falling on the white stretch of table cloth, as we have got used to, it fell, in Da Vinci's picture, upon the dark figure of Christ. The air was the lightest colored portion; it was not toned, as Morghen represented it, to ease the lack of engraving. To the wonderful rythm and flow of line there existed in the original a rythm of illumination through the use of windows in the background, alternating with spaces of wall, so that the groups at the table were in darker and again in lighter outline. The differences in the expressions of the faces between those of the new engraving and Morghen's are too subtile for description in a concise description. Morghen's are weaker in characteristic. It is true that Leonardo modified. There are so many proofs of this that the very fact of St. John in the Venetian study being different in the direction of greater passionateness of expression than is found in the final delineation in S. Maria delle Grazie, goes far towards accrediting the sketch as Leonardo's. He studied from life and modified from a sense and an ideal of beauty and grace. Modifying, however, is not taming, and it is taming that Morghen is seen to have been guilty of. His mind and taste were possessed by the classicism of the time and this mistaken classicism caused him to stamp a sort of stereotyped mildness upon the expression of most of the apostles in place of the exquisite individualization of Da Vinci.

The discoveries made in respect to minor points were first that the table-cloth in the original was not wrinkled by multitudinous fine folds and that the salt-cellar, represented as overturned by the right arm of the frightened Judas, was an introduction of some late engraver inclined to *genre*. It is not found in the original painting, nor has it ever existed on the wall. Why Morghen, or rather, why d'Oggionne, should have introduced the folds it is in vain to guess. That they were studies from nature is quite probable. I once saw precisely the same singular spectacle which the cloth makes in Morghen's engraving, on an artistic tour, when our small steamer shipped a sea and the table was deluged with water from above, and again in Italy, where our hostess laid a cloth yet damp from the mangle. As the adornment of the table by dishes is plain in the "Last Supper," the richness of folds added a modest variety of line and small shadows to the stretch of flatness.

The size of Stang's engraving is one more point to be noticed in it, for, while having the same length as Morghen's, it is over an inch higher. Morghen was influenced to reduce his print to agree with an engraving of Guido Reni's "Aurora," with which it was exhibited. Stang's print, besides being an improvement, is in accordance with the proportions of the original, in which the ceiling does not press so near upon the heads of the apostles as is usually represented.

The whole length of time spent by Professor Stang over his work was within two years as long as that which Leonardo is said to have used in producing the original, or fourteen years — from 1874 to the present.

Countess v. Krockow.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

CHAPEL OF THE EPISCOPAL THEOLOGICAL SCHOOL, CAMBRIDGE, MASS. MESSRS. WARE & VAN BRUNT, ARCHITECTS, BOSTON, MASS.

[Gelatine Print issued only with Gelatine and Imperial editions.]

CITY-HALL, KEARNEY, NEB. MR. G. W. FRANK, ARCHITECT, KEARNEY, NEB.

This design was accepted after competition. The building whose estimated cost is $22,000, will be of pressed brick and Colorado red sandstone on two fronts.

RINDGE INDUSTRIAL SCHOOL, CAMBRIDGE, MASS. MESSRS. ROTCH & TILDEN, ARCHITECTS, BOSTON, MASS.

THE TOWER OF LONDON, AFTER AN ETCHING BY M. LUCIEN GAUTIER.

ENGINE-HOUSE NO. 15, DETROIT, MICH. MESSRS. DONALDSON, & MEIER, ARCHITECTS, DETROIT, MICH.

HOUSE FOR CYRUS H. K. CURTIS, ESQ., CAMDEN, N. J. MR. A. W. DILKS, ARCHITECT, PHILADELPHIA, PA.

ENTRANCE TO THE MOST HOLY REDEEMER CEMETERY, PHILADELPHIA, PA. MR. J. J. DEERY, ARCHITECT, PHILADELPHIA, PA.

CO-OPERATIVE BUILDING IN THIS COUNTRY.[1]

THIS subject is no new one to members of the Social Science Association. It was first brought to our notice in 1874, by the late Josiah Quincy, of Boston, who wrote copiously on the questions involved in that year and in 1875–6, and it was investigated by committees of our social science department from 1874 to 1879. Our first publication of the facts collected (in a report made by Robert Treat Paine, and the late John Ayres, at our Detroit general meeting, in May, 1875) attracted much notice, and was followed by several other investigations by societies and individuals. Our association continued the matter by a paper read at the Brighton meeting of the British Social Science Association in October, 1875; by an extended report read at our Boston meeting of January, 1876; by several papers (which were published) and a discussion at our Philadelphia meeting in June, 1876; and finally by reports at the Boston and Cincinnati meetings of our association in 1878. At this last named meeting, the facts concerning co-operative building associations in Cincinnati were ascertained, as they had been ascertained and made public for Philadelphia in 1875–6. Philadelphia was the first breeding-ground of these associations in America; they were introduced there, in a suburb of that city, about 1831, and by 1874 had increased in number to at least 400; while they had also spread into New Jersey and Delaware, and from Maryland had been transplanted into Ohio, but with a system of management in some respects very unlike that of the Philadelphia associations. In Cincinnati, in May, 1878, we found there were at least 15,000 members of these building associations, paying in weekly not less than $60,000; and this had been going on, and the associations had been increasing in spite of the "hard times," from 1876 to 1878. Meantime the building-associations of Pennsylvania and Michigan had been suffering from these "hard times," and from certain defects in their State laws, involving judicial decision unfavorable to the whole system. In the light of these facts the State of Massachusetts at the suggestion of Josiah Quincy, Gamaliel Bradford, Robert Treat Paine, and other members of our association, and with the hearty support of many persons of small means, who were desirous of forming such association, passed its act of 1877, defining and regulating "co-operative savings-fund and loan associations," as they were briefly termed by Massachusetts law. There had been much opposition in 1875–6, to the enactment of such a law, the old savings banks being fearful that these new organizations would injure them; but such has not been the result. Scarcely had the organic law been passed — May 14, 1877 — when, in July, 1877, the first of these corporations in Massachusetts, the "Pioneer Co-operative Bank," was established, with our former associate Gamaliel Bradford, as president, and D. Eldridge as secretary; and we now have from these two gentlemen — Messrs Bradford and Eldridge — a report on building-associations in Massachusetts, which practically covers the whole of New England, and may be summarized as follows:

In January, 1879, Josiah Quincy, writing to Mr. Sanborn, said: "The co-operate fund and loan associations are, I think, fully established in Massachusetts; there are a dozen in the State that I understand are doing well. The two in Boston (the Pioneer and the Homestead) have nearly 1000 members and loan $5000 or $6000 a month." This was nearly 10 years ago. To-day Mr. Eldridge reports in Massachusetts, 64 co-operative banks of which 13 have been organized since October 31, 1887. The 51 previously organized are reported by the State Savings Bank Commission as having 20,735 members, an average of 400 each, with 134,164 shares, and assets amounting to $4,211,949. The present assets of the 64 banks exceed $5,000,000, the yearly increase being nearly $1,000,000 in Massachusetts. Of these 64 Massachusetts building-associations, the Pioneer Co-operative Bank is the oldest, and presumably the richest. On the first of April, 1888, it had assets of $238,195.68 — an increase during the year preceding of $22,728, or more than 10 per cent. Its receipts during the year from all sources were not quite $150,000, of which more than $60,000 was from dues and fines. It had 776 members, with 59,955 shares, and 170 of these were borrowing members — a little more than one-fifth of the whole number; of its first series of shares, upward of 1700 originally, only 36 remained outstanding; while of the nineteenth series issued in October, 1887, 595 are outstanding.

[1] A Report from the Special Committee on Provident Institutions, read at Saratoga, September 7, 1888, by F. B. Sanborn, Secretary of the Committee, and published in the *Springfield Republican*.

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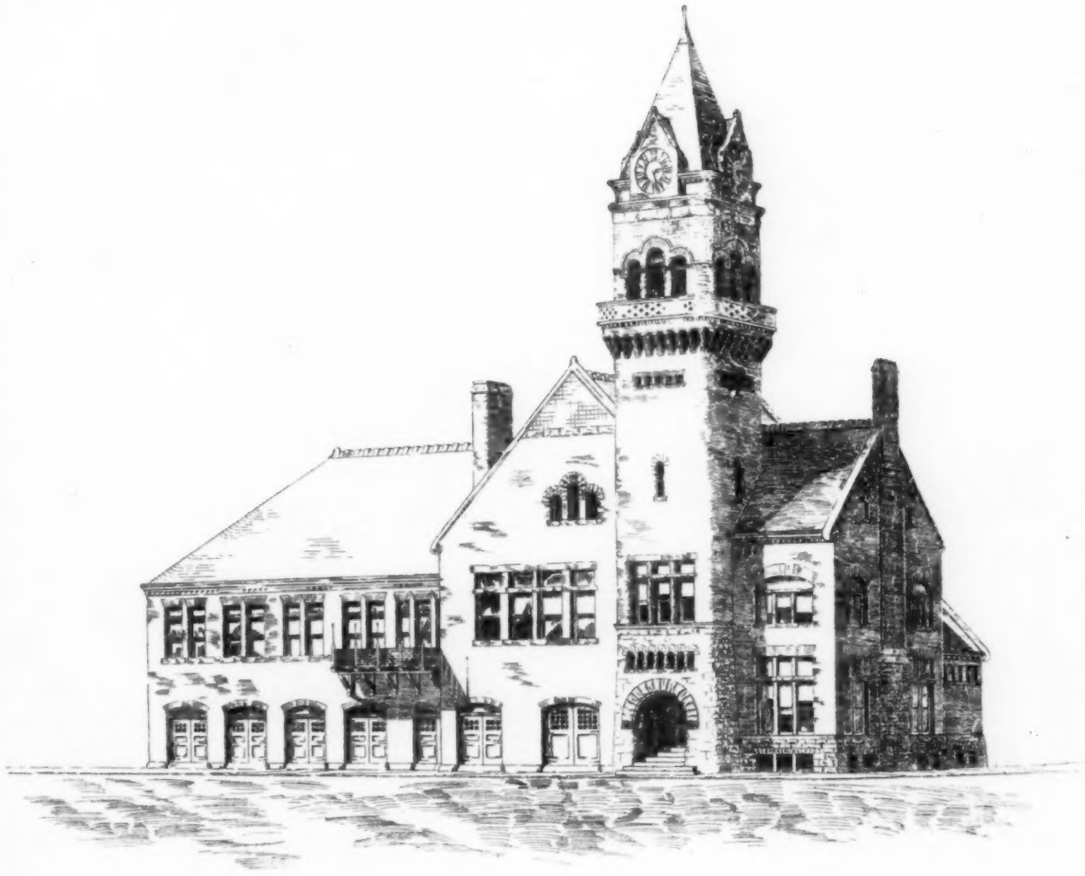
CITY HALL
KEARNEY, NEBR.

FIRST FLOOR PLAN.

SECOND FLOOR PLAN.



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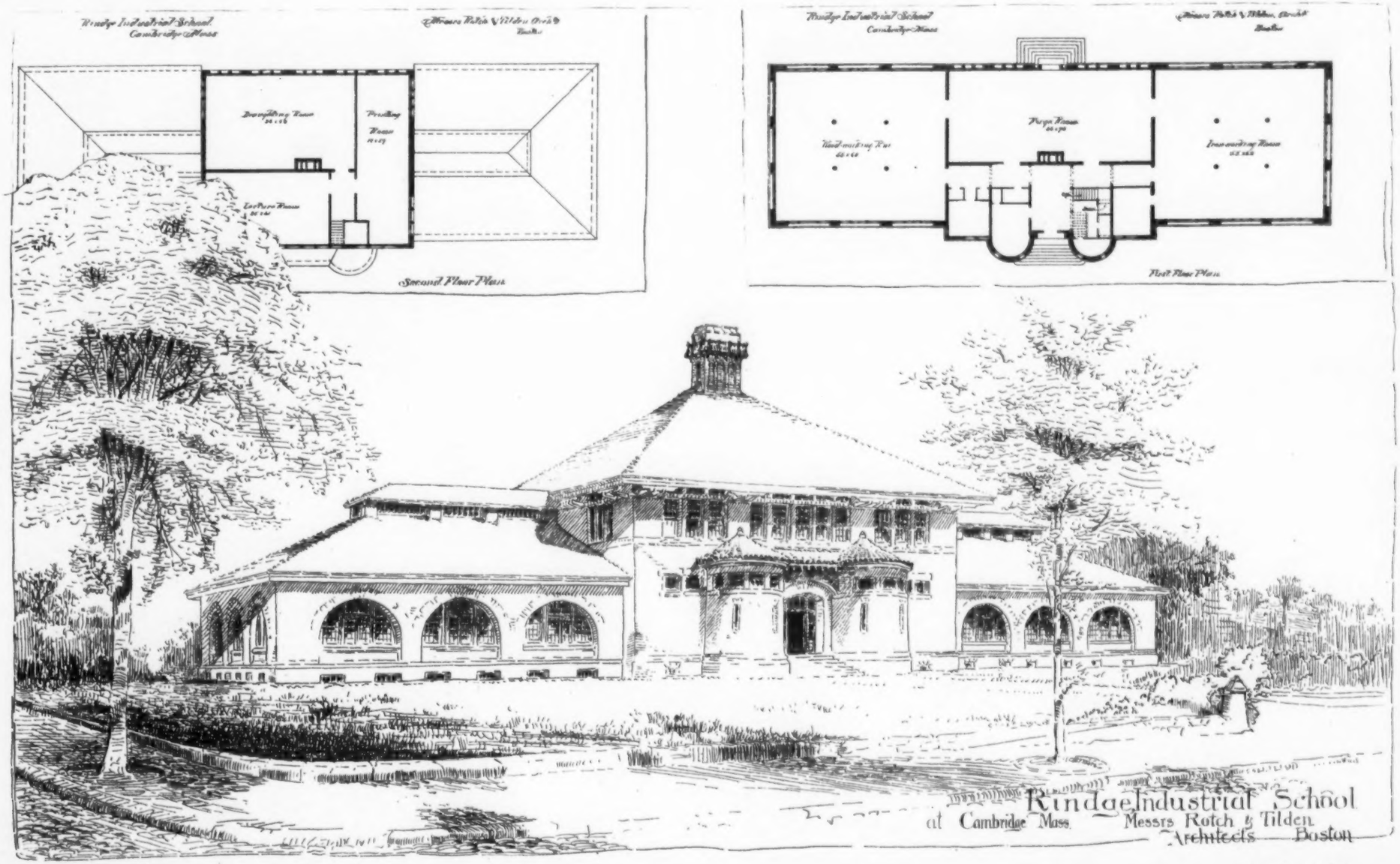

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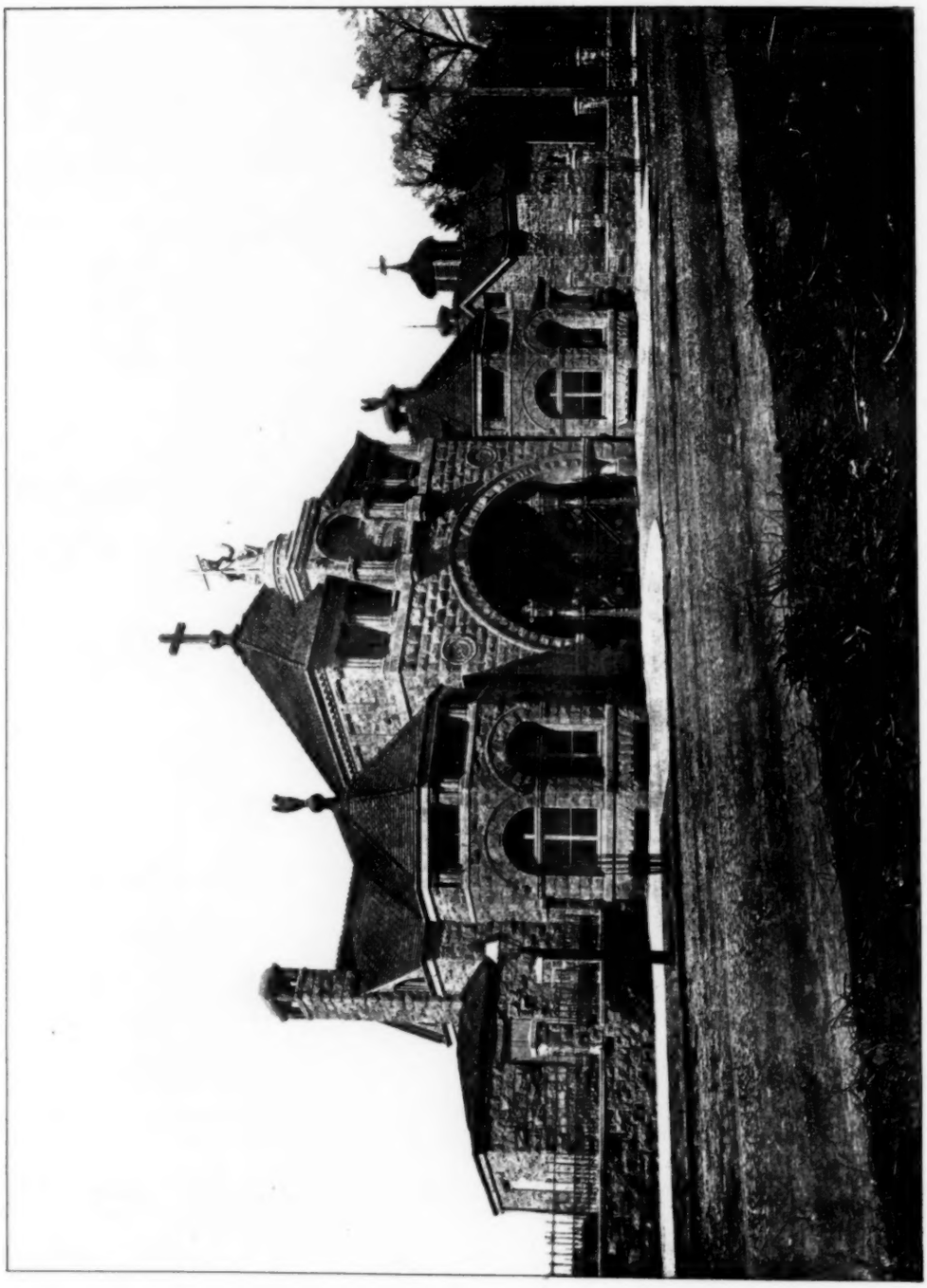

ENTRANCE BUILDING TO THE MOST HOLY REDEEMER CEMETERY, PHILA. PENN.
JOHN J. DEERY, ARCH'T.

Heliotype Printing Co. Boston.

Of the other 63 banks, about 10 are in Boston, and the rest are well distributed through the cities and large towns of Massachusetts, there being 3 in Worcester, 3 in Taunton, 2 in Fall River, 2 in Haverhill, and 1 each in Lowell, Lynn, New Bedford, Cambridge, Chelsea, Somerville, Springfield, Holyoke, Westfield, Fitchburg, Waltham, Woburn, etc. Scarcely 3 of the 25 cities of Massachusetts are without such associations, while several of the large towns where skilled workmen are numerous, like Amesbury, Marblehead, Natick, Plymouth, Sandwich, Stoneham and Wakefield, have each one of these banks. They are now increasing in number faster than ever before, and seem to be on a good financial basis and well managed under a State law so good that it is taken as a model in other States.

In Maine there 10 or 12 of these associations, mostly organized within 5 years. In New Hampshire there are 4, all organized since January, 1887. In Rhode Island there are 3, the principal one being at Providence. In Connecticut there are 6 or 7 in different parts of the State, — 1 at New Haven, with a special charter, and the rest voluntary associations, without charters, at Meriden, New Britain, etc. In Vermont there is no law for such associations, and none are organized. In all New England, therefore, there are not far from 90 building-associations or co-operative banks, and they are fast increasing in number.

The largest proportionate number of these corporations is found in the five Middle States, New York, New Jersey, Pennsylvania, Delaware and Maryland; for it was in two or three of these States that they were first started, and have been spreading gradually for more than half a century. It was not until 1849, however, that the first incorporated building-association in Philadelphia was chartered; although 50 or more unchartered voluntary associations had existed there from 1831 to 1849. After 1849 their growth was rapid, for 148 were chartered in the 10 years, 1860–69 inclusive, 317 in the 6 years, 1870–75 inclusive. In 27 years, then, 692 building associations were chartered in Philadelphia alone, and at least 450 of these were in active operation in 1876, when the great Centennial Exposition took place in the city of Franklin. Probably in the whole country, at that time, there were not as many more in existence, for there cannot have been 900 such associations in the United States in 1876. There are now probably more than 1000, outside of Pennsylvania; and M. J. Brown, of Philadelphia, estimates the number in all Pennsylvania, now, as 900, — 450 in Philadelphia, and 450 in the rest of the State. In New Jersey there are probably about 140 associations; in Delaware 30, in Maryland 50, and in the State of New York at least 200. This would make more than 1200 such associations in the five Middle States.

It may be asked what amount of capital is invested in these associations in Philadelphia, and in all Pennsylvania. M. J. Brown has undertaken to answer this question, and his figures, though partly estimates, have great value. He examined the sworn accounts of 120 building-associations with the following results: Aggregate capital, $8,749,337; average capital, $72,911; aggregate shares, 151,680; average shares 1264. Applying this ratio to the other 330 Philadelphia associations, their capital becomes $32,810,017, and the number of their shares 568,800. It is, therefore, probable that in all Pennsylvania there are now nearly 1,000,000, shares in these associations, and that they represent a cash value of at least $60,000,000. The whole savings-bank funds in Pennsylvania hardly reach this sum, and when it is considered that the savings effected by the building-associations are continually passing out of their hands into those of the shareholders, in the form of occupied houses, it will be seen that the actual savings of these associations must be much greater than their capital at any one time. In 1876, Joseph Doren estimated this sum at $50,000,000 in Philadelphia alone, and by this time it must exceed $100,000,000, for mortgages were then making at the rate of 3,750 a year, at an average of $2,000 each. This would show an investment of $7,500,000 each year in mortgages, which in 12 years would be $90,000,000, and of this sum at least $60,000,000 must have been paid off by the natural operation of the system. It is therefore probable that $150,000,000 is none too much for an estimate of the now existing savings effected in Pennsylvania alone by the building-associations. No other State can probably show half as much.

New York has only of late begun to develop the system on a large scale, although some building-associations have existed there for more than thirty years. The old law, under which they organized was passed in 1851, and in the next year, 1852, the first Rochester association was organized and continued in operation for a few years. No other appeared in that city for nearly twenty years, when many sprang up which were used for speculative purposes, and checked the growth of the better kind, then so numerous in Pennsylvania. But in 1882 the Rochester associations began to "boom," as the phrase is, and there are now said to be eighty of them in that single city of Rochester, of perhaps 125,000. In Buffalo, with a population of 225,000, the number of building-associations is nearly as great as in Rochester, — the largest of these being the Erie Savings and Loan Association, which is less than five years old, but has issued more than 5000 shares of semi-annual series, and now receives more than $40,000 a year in dues and fines, and more than $8000 a year in premiums and interest. In the other cities of central and western New York, — in Elmira, Syracuse, Utica, etc., these associations have also been forming rapidly of late, and the Chemung Valley Mutual Loan Association of Elmira, has existed for thirteen years, and now has assets to the amount of $175,000, and about 450 shareholders. In the cities of New York and Brooklyn, new associations have been fast forming for two years past, and now for the first time the system seems to be actually planted in that great commercial and manufacturing centre.

The New York *Star* has been devoting a column a day to the explanation of the building-association system, and one of its editors, C. F. Southard, has prepared a small manual for the use of inquirers and of members of these companies. It is impossible to say how many of these associations now exist in the State of New York, but they must be counted by hundreds. Most of them are organized under the old and faulty law of 1851 (Chapter 122) and there is an unfounded impression that the more carefully drawn act of 1887 (Chapter 556) will somehow injure an association which organizes under it. At the State Conference of Building-Associations, held at Rochester, May 17–18, 1888, the impression seemed to be shared by a majority of the delegates from about 100 associations there represented. A small minority of the delegates believed that the associations should be examined by the officers of the State Banking Department, and it was over this question that the conference had its most animated discussion. A resolution calling upon the Superintendent of the State Banking Department to make such examinations was introduced but subsequently withdrawn, and no official action on the question was taken. The settlement of the great majority of the delegates was that such examinations, made annually or oftener, would be both expensive and useless. The law of 1851 does not provide for such examinations of loan-associations as are made of banks, but it does provide for an examination upon the request of not less than five stockholders, and it was claimed that this was all that was needed. It was further said that the business of the loan-associations is conducted publicly at regular weekly meetings, that the stockholders take an active interest in everything that is going on; and consequently opportunities for dishonorable practice are very slight. Finally, it was said that the law of 1851 has worked successfully for thirty-seven years, that losses by reason of failure have not equalled 1 per cent of the capital invested, and that the best policy is to let well enough alone. There is force in these arguments; but the advantages derived from State supervision and public report far outweigh the disadvantages, and any extension of these associations in any State should be accompanied with ample protection for the investors by frequent reports from some public office and State supervision of methods.

In New Jersey these associations have been reported on by the State Labor Bureau, from whose reports it appears that there are in the State no less than 140 building-associations, with a capital of $7,000,000 or $8,000,000. In Delaware they are also numerous, but chiefly in Wilmington and its vicinity. In Maryland they are chiefly found in Baltimore and its suburbs. The New Jersey associations began before 1847, but it was in that year that the State Legislature first recognized their existence. An act encouraging their formation was passed in 1847, another in 1849, and the latter, as revised in 1875, is now the State law on the subject. In 1880 the Labor Bureau began to report on them; in 1882 there were something more than 100 associations in New Jersey, with nearly 20,000 members, who owned 102,075 shares, and paid in dues about $4,250,000 annually. In 1885 these societies had increased to 130, and they may now number 150. It was estimated by the New Jersey Labor Bureau in 1885 that there were then in the whole United States 3000 building and loan associations, with 450,000 members, and an aggregate capital of $75,000,000. If this was so the capital must now equal $100,000,000.

For various reasons, some of which are stated by R. T. Hill, of Texas, in his report concerning provident institutions in the extreme Southwest, there have been few accumulations of savings in the form of money in the greatest part of the South. The number of savings banks there is small, and building-associations are recent and, as yet comparatively few. Mr. Hill estimates that there are fifty in Texas, which is probably more than in any of the former slave-holding states, unless Maryland be an exception. They are numerous in Missouri, and a few are found in Arkansas, Mississippi, Kentucky, Tennessee, Louisiana, Alabama, Georgia, the Carolinas and the Virginias. From these States, however, the committee have only scanty reports. There are twenty or more associations in the city of New Orleans, several in Atlanta, one in Georgetown, S. C., one at Key West, Fla., one at Pensacola, one at Selma, Ala., one at Fort Smith, Ark., one at Lafayette, La., one at Parkersburg, W. Va., one each at Yazoo City and Columbus, Miss., and no doubt many others in the above-named States. In Louisiana it seems that as long ago as 1873 a building-association was formed, which ran its course in ten years and divided its profits among the members. But the first of the existing New Orleans associations was organized in September, 1882, and has since been very prosperous, having now about 600 members, who have built or purchased more than 100 homes during the six years of its existence. Several others of the 20 or 30 New Orleans associations have from 300 to 600 members. In Tennessee the associations organized in 1880–81 and in 1885, in order to defend law to better advantage, formed a State union, which, at its organization, included six associations at Memphis, four at Nashville, and four or five others in different parts of Tennessee. There are now five or six in Chattanooga, which during seven years past

have provided homes for 250 families, and in all Tennessee there must now be upward of 30 associations.

In Missouri the number exceeds 40, and may be much larger. An act passed in that State last year has led to litigation to test its constitutionality. The act in question was passed March 31, 1887, to govern the formation of these associations, and in many respects differed from the statutes then in force. The last enacted law claimed such associations to be benevolent associations, and consequently exempt, as mentioned in Article 10, Section 21, of the State Constitution, from the payment of tax on the capital stock, there being already an article in the statutes of 1879, governing the formation of benevolent, religious, educational and miscellaneous societies, which under the constitution were exempt from payment of said tax on their capital stock when incorporating. The Secretary of State was of the opinion that this part of the act of March, 1887, was void, and declined to issue certificates of incorporation until the tax on the capital was deposited with the State Treasurer, to be held until the determination by the court of the question of the legality of that part of the act of 1887. Under this arrangement 34 associations deposited with the State Treasurer the amount of the tax on the capital stock, aggregating $6608. If the court sustains the associations, this money will be returned to them. This question in Missouri was earlier raised in New York, and has there been practically decided against taxation, because in that State savings banks are not taxed. There are States, however, such as Massachusetts, where savings banks are taxed, and there seems to be no reason why building-associations may not be, should the public good require it. We are inclined to estimate the whole number of building-associations in the former slave-holding states, exclusive of Delaware and Maryland, at 200, but they are fast increasing.

In this section of the country, Ohio, and especially Cincinnati, was the pioneer in establishing building-associations. Dr. P. A. Keck of Cincinnati has the credit of beginning the first one in that city in 1867, where there are now perhaps 100. Three years ago Dr. Keck wrote an account of his work in Cincinnati, in course of which he said: "There are too many building-associations. At the time I started the system I thought that five or six societies would be enough for the needs of the people of this city, but now there are so many that I think a great many people suffer by it — the butcher, the baker, the doctor, the tenant, the landlord, and almost everybody else. Some of the members of the associations, instead of paying their debts, put their weekly earnings into these associations and get their dividends every year. It is my opinion that societies nowadays pay too much in the way of salaries and current expenses, such as the purchase of safes, etc. The object of such associations is the saving of small amounts by individual members, and the current expenses of the society should be reduced to the minimum figure. When I started the first society here, we paid our secretary $1 a night, and afterward $2. Now secretaries are paid $5 a night, and even that amount is not considered enough by some people. The whole number of these associations in Ohio can only be guessed at, for the Cincinnati member of our committee has been unable through ill-health to collect the scattered statistics. There are about 400 associations in that city alone — or at least in Hamilton county — and in Dayton, Toledo and many smaller cities these societies exist. It is supposed that Ohio stands next to Pennsylvania in the number of its building-associations, and that they exceed 600 in Ohio, while there may be 1000 in Pennsylvania, large and small. In Cincinnati the shareholders are estimated at 75,000 and the amount of weekly payments of all sorts is reckoned at $1,500,000. A further estimate gives $300,000,000 as the amount invested in Cincinnati by these associations in 10 years; but this is probably excessive. They far outstrip the savings banks of Cincinnati in the amount of their investments, however, and in the number of their depositors. The majority of these are Germans, or of German descent, but there are also Irishmen, Americans, negroes and men and women of every race among them. The Ohio law was amended in 1886, after much discussion, but the financial system there pursued is open to some criticism from Pennsylvania and Massachusetts."

Illinois comes next to Pennsylvania and Ohio in the number of its associations, there being nearly 300 in Chicago alone, and exceeding 400 in the whole State. The valuable report of Professor Jenks of Galesburg, and the unique schedule prepared by him with great labor, throws more light on the operation of these Illinois associations than his modesty has allowed him to mention. It appears that the 200 or more associations in Chicago alone have a much higher average number of shareholders than the 250 or so which exist in the rest of Illinois. Thus, while 16 Chicago associations average 589 shareholders, of whom 164, or more than 26 per cent, are women, the 37 associations outside of Chicago average only 244 shareholders, of whom only 54, or but little more than 22 per cent are women. The loans to members in 24 Chicago associations average in a year $210,690; while in 53 other Illinois associations they average only $62,002. The average loan to a member in Chicago is $1329, in the rest of Illinois, $710; while the whole amount of Chicago loans in 24 associations is $5,056,578, and in 53 outside associations $3,286,092. It is probable that the most prosperous associations made reports, so that the average of loans to the amount of $108,350 in each association is doubtless too high for the whole 450 in Illinois. But if we call the average loan only $80,000 in a year, this would give for Illinois alone an aggregrate of $36,000,000 as the yearly amount lent to shareholders by these associations. This is twice the amount of savings-bank deposits in the State, according to Professor Jenks, while the building-associations are increasing their business much faster than the savings-bank business of the bankers of Illinois is increasing.

The early building-associations mentioned by Professor Jenks as existing from 1849 to 1869 were rather speculative real-estate companies than co-operative loan-associations after the Pennsylvania model. Such began to be formed in Illinois after 1869, and the oldest now in existence dates from 1874. It was about the same time (1870–72) that the building-associations in Missouri began; and probably Indiana, lying between the two States of Illinois and Ohio, did not have building-associations much earlier than 1870. The number in that State can only be estimated, and our member, Mr. McCulloch, does not attempt to guess at it; but we may set it down as between 100 and 200. From Iowa we have no returns, and cannot reckon her building-associations at more than 100. The first was formed at Burlington in 1870, the second and third at Keokuk and Oskaloosa in 1872.

Michigan seems to have had an earlier experience with these societies, and one which for some years previous to 1875 gave the legal and financial leaders of that State a very unfavorable impression of their nature and results. Consequently the State law of 1877, under which perhaps 15 or 20 building-associations now exist, was far less favorable to their formation than the laws of Pennsylvania, Ohio, and finally of Illinois. This state of things was changed in 1887, by the passage of a law more satisfactory to the association members than the old law had been. Under this new law about 40 new associations have already been organized, so that the whole number in the State may be about 50. Laverne Bassett, of Ann Arbor, who has collected what information he could (in place of Professor H. C. Adams) about the Michigan associations, gives their average membership as 180, and their "average authorized capital" as $2,367,000; one of them having an authorized capital of $5,000,000, while a new and small association has but $100,000 nominal capital.

Minnesota though later of development than Michigan, has a much larger number of building-associations — probably not less than 125 at present, and fast increasing. A well-known journalist, Albert Shaw, of Minneapolis, writes, in the "*History of Coöperation in the United States*" (published at Johns Hopkins University), the following statement: "Several of the most flourishing building and loan associations to be found anywhere in the country are established in the neighboring cities of Minneapolis and St. Paul; and they have been the means of providing many hundreds of workingmen's families with pleasant homes of their own." He mentions eight of these associations in Minneapolis, the first of which began in 1874. In the whole State of Minnesota, as we are informed by a citizen of St. Paul, there are nearly 120 of these associations, and nearly or quite 50 of these are at St. Paul. Probably Minneapolis has 20 by this time. From 8,000 to 10,000 homes in St. Paul have been secured to their occupants by this new system of borrowing and guaranteeing. Whatever the figures of invested capital may be, they are changing so fast, from one day to another, that they give little real indication of the present state of things, still less of the accumulations that have really been made under the method of saving. As an experienced writer (M. J. Brown, of Philadelphia) says:

"It is fair to suppose that about one-half of the income received by building associations for dues, etc., is now being laid out on account of matured shares and withdrawals, for many of these societies are now maturing series of shares every six months or every year. The capital increases largely until the shares begin to mature, but when that point is reached, new shares admitted from year to year do not contribute any more than enough capital to take the place of the older retiring shares. In the Philadelphia associations the cash income is more than half the capital, which would indicate an enormous capital growth; but the outgo is largely for matured shares and withdrawals, resulting in almost a fixed sum for the capital. This is really a factor in favor of the societies, for they are now distributing millions of dollars every few months to the members who have been saving for years for some cherished object."

What is true of Philadelphia has long been true, in this respect, of Cincinnati, and is now true of Chicago and St. Paul. The number of associations reported in the last named city three months ago was 45 with an average of 3,000 shares in each one, and an average value of $50 a share. Assuming that this is true of the 120 in the whole State, this would give an investment of $18,000,000 in Minnesota alone; but this may be an over-estimate. The deposits in Minnesota savings banks hardly exceed $5,000,000, and the rapid growth of these associations has certainly checked the growth of savings banks there, as it has in Rochester, N. Y., in Buffalo, in Pittsburgh and in every State west of the Alleghanies.

From Wisconsin we have no information leading us to suppose that there are 50 building-associations in the whole State, although they began there in 1882 or earlier. In Minnesota, they began in 1869, though their great development has been since 1880. They exist in Nebraska, in Dakota and Montana, but from these we have no returns. In Kansas they have lately made a very rapid growth, and now exceed 100 in that State.

California has had these associations for some years, and for a time maintained a monthly newspaper devoted to their interest. In 1887 there were in California 11 building-associations with 30,000 shares and with assets of $2,595,488. This indicates large operations for each society, and points to a speculative element in the

California associations, which is very apt to appear in that State or elsewhere when real-estate speculations are going on actively. The reports of some of the California societies show average loans of $2,000, which is much above the Chicago rate, and, we believe, higher than the Philadelphia rate. But we have nothing to prove that the California business is unsafely done; and there are few States where there is greater need of some method to increase the number of small estates owned by their occupants. From the other Pacific States and Territories we have no returns at all.

From all the information attainable by the committee, there is no reason to doubt that there are now 3,000, perhaps even 3,500, co-öperative building and loan associations in the United States, and that they provide for the investment, at any given time, of not less than $300,000,000. The accumulated investments in the form of houses and land, which have been paid for by the occupants or their families through the medium of these associations in a long series of years, must be much greater than $300,000,000. Twelve years ago Mr. Doren, a competent authority, estimated this accumulation at $100,000,000 for Philadelphia alone, where the annual payments then exceeded $7,500,000. There must, therefore, be an accumulation in Philadelphia alone at this time of $180,000,000 at least, and in the whole country there are now more than six times as many associations as in Philadelphia. We may, therefore, safely estimate the whole accumulations made by the aid of building-associations at from $500,000,000 to $750,000,000 in a period of 40 years. The savings banks of our country have provided for much greater accumulations in the same period, but it must be remembered that they are much older than the building-associations in the wealthiest portions of the United States. At the rate the building-associations are now gaining, the time may come when their accumulated savings at any one time will exceed those of our savings banks, immense as Mr. Townsend's report shows that they are and will be.

It is doubtful if any system for savings has ever been devised which has such a tendency to produce a frugality among persons of small income as the building-association methods. There is nothing to repel and everything to attract such persons who are paying rent or board, and wish to avoid doing so. Borrowing, which in the ordinary form is apt to discourage or demoralize the poor man, is here an incentive to industry and economy, for he must earn and save money to keep up his investment, from which he is taught to expect greater profits than are usually returned to him in cash. But the return he gets in relief from rent-paying is itself a profit, which also appears to his imagination greater than it commonly is. The excitement of betting, the pleasure of house-building, the companionship and competition which he finds in belonging to such a society, all lure him forward in the way of economy. There are drawbacks and there are dangers in these petty financial ventures which in the aggregate are so vast; but these are no more than attend the usual investments of money. We must, therefore, expect such associations to increase in number and to absorb more and more of the earnings of the people, just as life insurance absorbs more and more of the surplus income of classes a little more prosperous than those who make up the great body of shareholders in the associations we have been enumerating.

THE LIFE OF AN IRON ROOF. — The Cincinnati Corrugating Company have obtained some valuable information from Mr. W. A. Meninger, of Covington, Ky., who has had upward of thirty-five years' experience in the roofing trade in that vicinity, on the life of an iron roof. Mr. Meninger stated that in 1856 he put up a corrugated-iron roof on what was then known as the Clayton Young House, at No. 33 West Fifth street, Covington, which is now occupied by the Sisters of Notre Dame as a school. This roof did first-class service and gave good satisfaction until about ten years ago, when, upon some changes being made in the building, it was taken off. The material composing it has since been sold to different parties and is now in use for covering various sheds, stables and other small buildings in Covington and vicinity. In 1861 Mr. Meninger covered the Charles Whitcomb House, adjoining the Fourth Street Presbyterian Church, with corrugated-iron. This roof is doing perfect service to-day. The expense for repairs, and even repainting, had been hardly worth mentioning. In 1863 he put a similar roof of corrugated-iron on a brick building erected for Mr. George Phillips, who then owned the property, the lot being now occupied by the Fourth Street Presbyterian Church. Mr. Phillips manufactured and prepared the materials himself in his rolling-mill. The building has been used as a dwelling house most of the time since then, and this roof has answered its purpose admirably. It is now in a remarkably good state of preservation, considering that it has had no attention in the way of repairing for a number of years. Mr. Meninger also cited the history of a number of old-time iron roofs with which he is personally acquainted. The old Howe warehouse on Market space had over it for over thirty years an iron roof. After affording complete protection for this long period, and over an almost flat surface, it was removed about three years ago. The Licking Rolling-Mill has a corrugated-iron roof which has been on it for over twenty-five years, and to Mr. Meninger's certain knowledge, it has never had a coat of paint since it was first put on. The Kentucky Central Railroad shops in Covington were originally furnished with a corrugated-iron roof, which remained for over 23 years in a good state of preservation, and was only recently removed on the occasion of some repairs and changes. — *Iron Age.*

MEDIÆVAL HOUSES.[1] — IV.

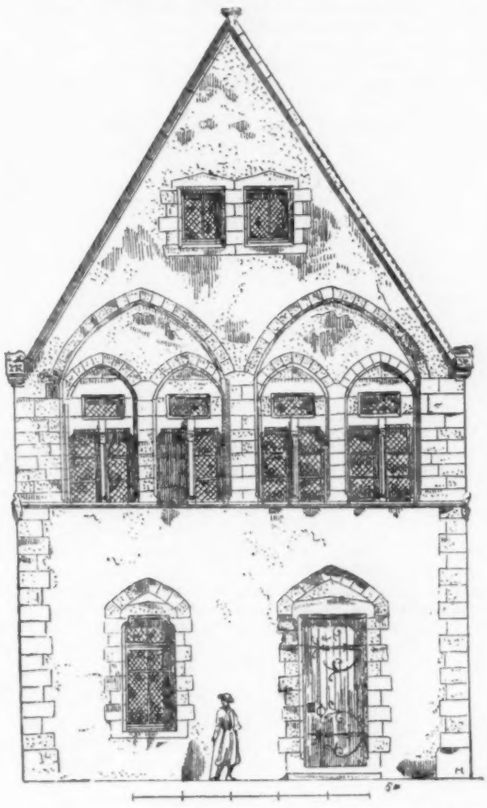

Fig. 16.

FIGURE 16 gives a front in Provins in the Rue de Paris, dating from the second half of the thirteenth century. Here the inmate shut himself up from the outside world. The *salon* and chambers are on the first floor, the ground-floor being reserved for common household uses, for provisions, the kitchens, etc. The stories are high between floors.

Evidently, life in these dwellings was broadly simple. Great care was bestowed upon construction, the openings were strongly arched in stone, and the façade, though made up of very few elements, wears a monumental character. They knew how to put art into a rough stone-wall simply pierced with openings, without decorations, without expensive construction, and conforming itself to strict necessity. Does not this predicate a very advanced social state and the highest point of art, and can we say as much for our own century? For a great number of people to-day, art is only one of the expressions of luxury, a mere superfluity; and, to them, a front not covered with columns or pilasters, with mouldings and ornamentations in the fashionable style, is by no means a work of art. The Middle Ages have left us very few books or discourses on the subject of their architecture, but they have built with equal art the richest structures or the humblest dwellings, loving and respecting art in its modest expressions, as well as in its most splendid conceptions.

A century which manifests its taste by multiplying ornamentation and increasing expenditure, daily neglecting the first principles of art, taking up one style after another and originating nothing, is only hastening the decline of art.

The palaces and monuments of to-day display wealth of ornament without order or reason; while the smaller houses are rough in workmanship, ridiculous, uniformly vulgar, and with sins of construction which usually find a speedy retribution. The only consolation which remains, in the midst of these miseries, to a lover of art, is a belief in the better judgment of posterity.

When art becomes only a thing of luxury its end draws near. In the Middle Ages the vital power of art was manifested everywhere; its expression was a want shared by great and small. The old houses which still filled our French towns a few years ago and which new wants have rapidly dismantled, were a living proof of this assertion. We do not pretend that at the cost of the public health and in the face of the prosperity of the middle classes, the old order could have been preserved, but we would like to find in our own private building such signs of a population loving art and striving to spread everywhere its true expression. But in the rich old Gallic blood, which, freed from long repression, coursed through the veins

[1] Translated from the French of Viollet-le-Duc, by Mr. A. B. Bibb. Continued from page 115, No. 667.

of the thirteenth century carrying life into all the provinces, covering the soil with structures of all kinds, original, logical, free, fit dwellings for a nation full of brilliant qualities — this blood, clear and pure, has been enslaved again under a second invasion of strangers; it has become once more Roman, and under such Romans! Symmetry has replaced logic; the phanton of a dead art stands in the place of the native originality of our country. False methods, persistently taught, have taken firm root, and an infatuation, which no one comprehends and no one explains, because it cannot be explained to minds naturally clear and logical, has replaced the innate taste for that pure art, in the midst of which we feel at home. The house of the Middle Ages in France is the dwelling of one born upon the soil. The house of our day is a stereotyped dwelling, alike for the lawyer, the soldier, or the lady of fashion, and uniformly inconvenient for all. There can be no comfort in such houses, and the passer-by observes only that the fronts are nearly identical and that we ought already to be dead of boredom, if that malady were ever fatal in France. But there is still hope in the fact that our time is not the first wherein they have tried to mould, let us say, the dwellings of a city into the semblance of a lot of boxes set in a line and exactly alike in shape. The rulers of the Middle Ages understood little better than our modern magistracies the canons of art, but they did not hinder the nation from developing its talent. The English rulers especially do not seem at this period to have appreciated the French talent, but in their position as strangers they were perhaps excusable. "In the last half of the thirteenth century, a time of peace and prosperity," says M. Felix de Verneilh, "a little corner of one of the provinces was covered rapidly by new towns called, in the ancient language of the South, 'bastides.' Alphonse de Poitiers, brother of Saint Louis, had become, through his marriage with the heiress of the Counts of Toulouse, the nominal Lord of a part of Guienne." As such, and notwithstanding that this sovereignty was often reduced to a mere title he endeavored to secure his direct authority by building a capital city, Villefranche de Rouergue. "In Agénois he founded Villeneuve d'Agen and several less important 'bourgs.' In Perigord, where he had some possessions, he also built 'bastides.'" These walled towns or "bastides" were built on ground given gratuitously, laid out after the plans of engineers, and enjoyed a liberal franchise. By this means he brought entire populations under his rule, and the scheme succeeded notwithstanding the protestations of rulers and the excommunications of the bishops.

"On his part," continues M. F. de Verneilh, "Edward I as duke and afterward as king, multiplied endowments of this character, which are among the best claims of this great prince on the remembrance of the ancient duchy of Guienne; Libourne, among others, owes its existence to him (1286) . . . ." Beaumont was also built for the profit of the King of England in 1272; Marshal Jean de la Linde commenced on his own domain the bastide of La Linde. The town of Montpazier was built in 1284.

The plan of Montpazier has never been altered. Like all the towns of this period in Guienne and Perigord, the town of Montpazier is not only laid out with perfect regularity, but all the houses are of equal dimensions and similar plan. A group of these houses (Figure 17) shows with what cellular uniformity they were built. The regularity observed in modern towns, such as Napoleon-Vendée and certain towns of Algeria is mere disorder as compared with this absolute symmetry. It would seem that all the people who came to live in these free "bastides," which were a sort of refuge offered by the sovereign, stood upon an equal footing; however that may be, it is certain that they submitted to levelling conditions of fronts and ground-plan, since these towns were built all at once and had attained a very high relative degree of prosperity soon after their construction. From which it would appear that those ideas which are generally supposed to belong to our time, to "working cities," and to centres of population established on a basis of absolute equality, are not new after all; and that the Middle Ages had even attained a practical application of them far beyond what we have done.

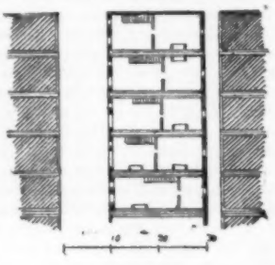

Fig. 17.

However modest these dwellings may have been, they were, at least, suited to the wants and habits of the period. They were all composed of a ground-floor, a first, and sometimes a second, story; their fronts were varied according to the tastes and fortune of each one, and they were well built and solid. The "place" of a town, on one side of which was usually built the market-house, was surrounded by low, wide porticos, terminating on the streets giving entrance to the "place;" the engineers who laid out the plans of these bastides were very careful not to cut streets debouching upon the middle of sides of this square, which would perhaps have conformed to academic rules, but not at all to those of reason. A "place" is generally an area, more or less broad, where the people meet; if two streets cut the centre at right angles, it is clear that the people passing would crowd those who rested there. To establish travel around the sides of a "place" and leave the middle free was the scheme upon which the planners of mediæval towns proceeded. Corners were cut off the houses at the angles of the squares, to allow vehicles to enter the "place" easily on market-days. Figure 18 is a plan of a quarter of the "place" of the bastide of Montpazier, and Figure 19 is a perspective view of the entrance to the "place," taken from the point *A* of the plan, showing how the angles of the houses are carried on corbellings over the cut corners which give a diagonal entrance to the "place."

The houses of these bastides at the end of the thirteenth century were built of stone, brick or rubble masonry. Wood was not used for the fronts. Wooden houses were very rare in the Southern provinces, though from the end of the thirteenth century we see them becoming more and more frequent in the provinces of the North. First, only the upper story was built in wood, then soon the ground-floor alone was in stone; and, finally, during the fifteenth century and the commencement of the sixteenth, the entire fronts were not only built in wood-panelling, but often entirely covered with boards, like great pieces of furniture, without an apparent trace of masonry. Over and above the taste which the people of the North have always preserved for wood-construction, and the influence which the traditions brought by the Northern invasions from the great forest

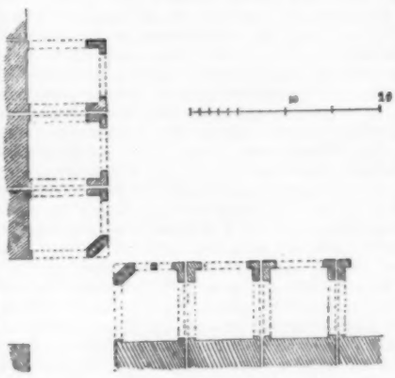

Fig. 18.

Fig. 19.

lands exercised on the people, wood-construction presented advantages which attracted all the inhabitants of the populous towns of the French provinces, properly so-called, to the employment of this method. In the large cities of the North, such as Paris, Rouen, Beauvais, Amiens, Troyes, Caen, etc., the "place" was rarely found. As these walled towns could not grow by spreading out as in our day, they tried to gain in height the space they lost in the ground-plan, and the houses encroached as far as possible upon the public street by projecting the upper floors on corbellings. Wood-construction alone lent itself easily to this arrangement, imposed by necessity. The fronts were sheltered by overhanging roofs, whether they built guttered fronts or gables on the streets. The thoroughfares becoming narrower and narrower as the cities became richer and more populous, the windows were enlarged so as to obtain the greatest possible amount of light.

It is worthy to note that while in our time, and with good reason, we try to gain plenty of light for our rooms, the oldest Romanesque houses had comparatively narrow windows which admitted very little light, the inhabitants seeking darkness in their interiors with as much care as we seek light, adhering in this to ancient traditions.

In the thirteenth century they began to enlarge their windows, at least in the *salon*. This tendency increased as active life, industry and commerce gained more importance among the city people, who needed the daylight for their avocations. The house was no longer

the closed refuge of the family, it was also the work-room, and from the beginning of the fourteenth century the houses in manufacturing towns opened on the street. Notwithstanding the liberal fenestration in the fronts of that period, it is wonderful how certain industries could be carried on in narrow streets crowded with overhanging stories; it is inexplicable until we see, for example, the silk weavers of Lyons working on the most delicate tissues in rooms where one can hardly see to read. The sight accustoms itself to obscurity, and the excessive natural, or fictitious, light that we require everywhere to-day is not a necessary condition for works of great fineness.

However that may be, from those mediæval workshops, which seem so dark to us to-day, came work of the goldsmith and embroideries and fabrics whose delicacy we do not easily attain with all our modern illumination. It is all so much a matter of habit that an artisan accustomed to work from his infancy in a doubtful light may be no mean workman. Because our fathers saw the "Cid" of Corneille by candle-light, we must not assume that they appreciated less vividly this chef-d'œuvre of the dramatist.

So much, then, for the criticism which charges the mediæval architects with having built small, dark, and uninhabitable houses. Dark and uninhabitable for us they may be, but their contemporaries found them commodious and sufficiently lighted.

This is, however, aside from the question of art; that the architectural quality of a house does not depend upon the greater or less breadth of the street on which it is built, is already proved.

(To be continued.)

COMMUNICATIONS

LEAD PLATES IN MASONRY.

WASHINGTON, D. C., Sept. 23, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your number of Sept. 8th, I read an article headed "Effect of Lead Plates in Masonry," in which reference is made to actual tests of compressive strength of stone in 1855. It speaks of a test on marble (1½-inch cubes), which showed a compressive strength of 60,000 lbs. per square inch without the interposition of lead plates between the steel plates of the testing apparatus, and a compressive strength of only 30,000 lbs. with the interposition of lead plates. The cause in explanation of this difference of 50 per centum of resistance seems to be somewhat obscure in the above mentioned article. The stone cube under pressure will in either case and all cases give away at the weakest place first, which is at the sides, the central portions being held firm by the outer portions until the latter give way. In case of interposed lead plates or any other more or less elastic bodies the question at once becomes a combined one of compressive strength and tensile strength. The lead plates under compression yield to a more or less degree; this yielding must result in a flow of the metal toward the sides, where the lead plates will then visibly protrude. This side motion of the molecules of lead under the enormous pressure incident creates also an enormous friction on the surfaces of the stone cube and the steel plate. It is the friction on the stone cube which acts from the centre of surface in opposite directions (radial) and tends to tear the stone cube asunder. The tensile strength of stone being generally much less than 25 per centum of the compressive strength, it seems evident that the stone cube must break or crush as it may appear, when lead plates are interposed, under a much smaller pressure than that necessary to crush it without the interposition of lead plates.

H. VON BAYER, *C. E.*

NOTES AND CLIPPINGS

A BURIED DALMATIAN CITY. — An Austrian Pompeii has just been unearthed near Zara. Zara is the capital of the Austrian province of Dalmatia. Thousands of coins of the Diocletian period and of other early times, rare specimens of Grecian and Roman sculpture and Byzantine architecture were discovered along the Dalmatian shore. Amphitheatres, temples, catacombs and other evidences of a busy and highly civilized community were unearthed. — *Associated Press Report.*

A CURIOUS PENALTY FOR A STRIKE. — The will of M. Bord, the well-known piano-maker of Paris, has given rise to some remarkable proceedings on the part of the testator's heirs and of the workmen employed in the establishment, which had been organized by the deceased and conducted by him with great prosperity for many years. M. Bord died a few months since, and under his will he left large legacies to his employés of every grade, the smallest amount bequeathed being $200 to each of those who had only been five years in his factory. After the death of the testator his nephews found another will in which no mention was made of legacies to the employés, and this being dated 1884 invalidated the first document. M. Bord had, in fact, disinherited his workmen, because they had struck for more wages in 1883. The workmen have in the meantime gone to law with the executors, in order to contest the validity of the second will, and out of 500 of them 150 have been dismissed from their employment. — *New York Tribune.*

RED TAPE AT THE PANAMA CANAL. — The Panama Canal seems to be suffering from red tape. On one occasion it took sixteen days' time and 200 miles of travel for vouchers for some lubricating oil, which was lying alongside of the dredges for which it was intended; and these dredges lay idle at a cost of $3000 a day until they could get the oil. Upon another occasion it took seven days to get five cents' worth of vaseline out of the basement of the building in which it was needed on some instruments of precision to prevent rusting. — *Philadelphia Press.*

A PECULIARITY OF GLASS EYES. — "The Rubbi family of Venice have been famous glass-blowers for nearly four centuries," says the London *Hospital.* "Their specialty is the manufacture of glass-eyes, which they make in all varieties of quality. Common glass eyes, such as are made for hospitals, are easily made, and cost about 8 *s* each. But fashionable people are not satisfied with these, and some have half-a-dozen eyes manufactured for them before they are satisfied. Then they require at least two sets of eyes, one for evening wear, with larger pupils than the day ones, because the pupil of the eye is larger by night. Think of the horror of a lady whom some accident has forced to wear a glass eye, on finding, after she had entered a ball-room, that she had put in the wrong eye, and was going about with pupils of different sizes. The effect would be as bad as a squint, or even of chronic wink."

PERUVIAN WHISTLING JUGS. — The silvadors or musical jugs found among the burial places of Peru are most ingenious specimens of handiwork. A silvio in the William S. Vaux collection at Philadelphia consists of two vases, whose bodies are joined one to the other, with a hole or opening between them. The neck of one of these vases is closed, with the exception of a small opening in which a clay pipe is inserted leading to the body of the whistle. When a liquid is poured into the open necked vase the air is compressed into the other, and in escaping through the narrow opening is forced into the whistle, the vibrations producing sounds. Many of these sounds represent the notes of birds; one in the Clay collection of Philadelphia, Pa., imitates the notes of the robin or some other member of the thrush tribe peculiar to Peru. The closed neck of this double vase is modelled into a representation of a bird's head, which is thrush-like in character. Another water vase in the same collection, representing a llama, imitates the disgusting habit which this animal possesses of ejecting its saliva when enraged. The hissing sound which accompanies this action is admirably imitated. A black tube of earthenware ornamented with a grotesque head in low relief, to which short arms are attached pressing a three-tubed syrinx to its lips deserves special mention, as it suggests the evolution of this instrument from a single tube to more complicated forms. — *The Clay Worker.*

PERMEABILITY OF PORTLAND CEMENT MORTARS. — A recent number of the *Annales des Ponts et Chaussées* contains an interesting article on the permeability of Portland cement mortars, by Messrs. L. Durande-Claye and P. Bebray. In conducting a series of experiments on samples of cement mortar taken from various marine works in England, France and Belgium, the authors observed that all these mortars were permeable. A block of the material placed in an earthenware dish in such a way as to divide the dish into two compartments was rapidly penetrated by a 6 per cent solution of magnesium sulphate poured into one of the compartments, leakage past the sides of the block being prevented by a water-tight joint of plaster. As the solution filtered through it was constantly removed by a siphon, and fresh solution poured in to the first compartment. At the end of sixteen days a fissure 3 or 4 centimetres long appeared in the block, and on the next day another crack was seen, the block swelling in the process. It was then determined to carry out a number of experiments with ordinary water, a solution of chloride of magnesium and one of sulphate of magnesium. The arrangement finally adopted was to close one end of a glass tube about 1 1-3 in. in diameter, with plugs of the cement mortar, the other ends of the tubes being closed with caoutchouc stoppers, through which passed glass tubes about 40 in. in length connected with Marriotte flasks containing the different solutions. The cement mortar used consisted, in each instance, of one part by weight of cement to four parts of sand, mixed with quantities of water varying in different cases from .07 up to .12 of the total weight of the mixture, and in all the experiments the rate of filtration was at first somewhat rapid, but diminished as time went on, becoming finally extremely slow. The glass tubes invariably cracked after some days owing to the swelling of the cement plug, thus putting an end to the experiments. Three series of experiments were made: in the first the mortar prepared with 9 per cent of water was the least permeable, that mixed with 7 per cent was extremely so, as was that prepared with 11 per cent. In the second series the best results were obtained with 11 per cent of water, and in the third series with 10 per cent. The action of the chloride of magnesium, which was a 6 per cent solution, was much less injurious than the solution of magnesium sulphate, which was of the same strength. Chemical analysis showed that the cements after being acted on by the latter reagent, contained from .75 to .80 per cent of sulphuric acid, showing that in the double decomposition taking place between the calcium and magnesium salts, a portion of the calcium sulphate remained in the body of the mortar, and it is to this fact that the authors are disposed to attribute the dislocation of Portland cement masonry when exposed to the action of sea-water, for whilst the magnesia produced is deposited in the state of a thin cream without consistence, the sulphate of chalk solidifies more or less completely in the crystaline form and develops considerable internal stresses. — *Engineering.*

Frankfort-on-the-Main Railway Station.—On Saturday the 18th ult., the new central railway station at Frankfort-on-the-Main was opened to public traffic. It is claimed that Frankfort is now in possession of the largest railway station in Europe and possibly also in the world. The new buildings extend over a superficial area of 31,284 square metres, thereby exceeding the railway station at Munich (hitherto the largest), by 12,000 metres and St Pancras Railway Station in London by 15,500 square metres. A certain idea of the vast proportions of this structure is gained from the fact, mentioned by *Kuhlow's Review*, that the Frankfort Opera-House would not take up quite a third part of the vestibule, in which the Mayence Town-Hall could be conveniently placed, and that each of the three platform-halls could conveniently accommodate the Cathedral of Cologne without its spires. The new station lies full half a kilometre distant from the old Western Railway station. This circumstance, which necessitates on the part of the public the expenditure of additional time, trouble and money, might easily have been avoided, and is, therefore, to be regretted. The town of Frankfort is in consequence extended by about half a kilometre from east to west, and doubtless a new town quarter will soon arise to fill up the intermediate space.—*Invention.*

Fatal Accident from an ascending Lightning Stroke.—*Il Telegraphista* gives a highly remarkable account of a fatal accident during a thunder-storm. In the Isle of Farignana, at a height of one thousand feet above sea level there is a telegraph station, a telephone office and a semaphore signal post provided with a lightning conductor. These three lines all make earth in a well. About three o'clock sparks were seen to be passing from the telephone lines to the walls of the iron-building in which the instruments were placed. It appears to have been raining at the time, but no mention is made of any other signs of a thunder-storm. The telephone attendant sent for a lineman named Auran; on his arrival he noticed that the lightning conductor belonging to the semaphore post had been fused at a point where it touched the iron frame of the building. Auran carried in his hand a hammer, with a wooden handle, which was connected to the head by two metal strips. He then touched *the earth portion* of the fused conductor with the hammer and immediately fell dead. It appears that the moment the unfortunate man touched the wire with the head of his hammer, he was in metallic connection with it through the two metal strips, with the floor of the building through his damp boots. It is suggested that a considerable difference of potential existed between the building on the solid rock and that of the earth, with which they were only in communication by means of the earth-wire which had already been fused. When the lineman touched the earth end of this wire a discharge passed through his body from the building to the earth.—*The Electro-Mechanic.*

Some Deserted Cities of India.—Those who found it difficult to believe in the possibility of such a deserted city as that described by Mr. Rider Haggard in "*She*," may, if one may judge from a London *Times* letter, prepare themselves for greater wonders in the architectural line, even if he should confine himself to simple description of actualities when he takes Holly and his friend to Asia. Says the letter: One of the strangest things in India is the multitude of deserted capitals. There are three old Delhis, three successive capitals of the East, all close to each other, all south of the present city. One of the three is Tugluckabad, a marvellous city on a hill, roofless, and absolutely deserted, but solid and gigantic. The second is Ferozebad, including the fort of Indraput, with a handful of inhabitants. The third is the old Delhi of Kutub, who was born a Turkish slave and died Emperor of India. His name still survives in the Kutub Minar, the finest tower in the world, springing aloft like a living organism, and in the oldest mosque in India, the Kutub Mosque. There is Daulatabad, in the Nizam's dominions, with a fort atop of a conical hill of black granite, artificially scarped. The fort is 500 feet above the plain; the city lies below, with European fortifications and dry moats; but almost the whole of the city is a jungle, tall enough to hide a herd of elephants. There we ate the best grapes we found in India, ripened naturally in February, square-sided, black, delicious. Thither it was Tugluck, the builder of that southernmost Delhi that still bears his name, dragged the whole inhabitants of Delhi, 800 miles off. "Twice," says Hunter ("*The Indian Empire*," p. 283), "he allowed the miserable suppliants to return to Delhi; twice he compelled them, on pain of death, to quit it." It was Tugluck who called the city Daulatabad, instead of Deogiri. He was a scholar and a soldier, and a very early, if unscientific, bimetallist. "Having drained his treasury, he issued a forced currency, by which he tried to make the King's brass equal to other men's silver. Foreign merchants refused the King's brass tokens, trade came to a stand, and the King had to take payment of his taxes in his own depreciated coinage." There is Golconda, once the capital of the Deccan, rarely entered by the traveller now. It is surrounded by a wall about four miles in circumference. The fortress is girt by a wall of about one mile. The citadel has an innermost wall, and on the very highest plateau of rock rests the King's palace. It is a deserted city, except the small garrison, with solid masonry of hewn stone, still firm. A high wall of some fifty feet runs round the zenana, with one breach on the southeast side. Aurungzebe's soldiers made that breach September, 1687. Hyderabad is half visible, amid its trees, the Char Minar and Mecca Musjid conspicuous above all. One side is the Mir Alam Lake, on the other the Ausan Sagar, a dozen small artificial lakes; antelopes below you, nibbling grass where busy streets ran two centuries ago. Grand tombs lie amid orderly gardens outside the city, and granite hills bound the horizon.

Microbes on Walls.—M. Esmarch, in *Le Génie Civil*, gives the result of some experiments in the detection of microbes on the walls of living-rooms, etc., that are calculated to alarm the timid reader not booked in the new science of microbiology. He wiped a certain surface on the walls of a room with a small wet and sterilized sponge, and then with this sponge impregnated some so-called culture gelatine. As a result he claims to have found from 17 to 5,391 colonies of microbes per 25 square centimeters of wall-surface, according to the character of the wall, whether it was paper, oil-paint, or polished plaster, and also whether the room was a bedchamber, a room in a hospital, etc. The upper part of the wall is less rich in bacteria than the lower six feet, according to M. Esmarch. He then used a process which destroyed the bacilli and left the spores alive; or he exposed the gelatine of culture to a temperature of seventy degrees C. for five minutes. He found that in his experiments there was one spore to forty-four germs, and at times no spores at all. A jet of steam on the walls did not much diminish the number of the germs. A solution of phenic acid, of two to five per cent, did not at once give absolute disinfection; but repeating the operation after twenty-four hours gave perfect satisfaction. M. Esmarch obtained the surest results by rubbing the walls with the *crumbs of fresh bread*. One operation was sufficient, except in certain bad cases where three or four were necessary, to remove all the living germs. But he cautions the user to be careful not to allow the crumbs to lie on the ground; they should be destroyed by fire.—*Engineering News.*

TRADE SURVEYS

Inquiries made among the managers of the great manufacturing establishments, bring out the fact that there is a large amount of contract-work now coming in sight. The builders of hydraulic-mining machinery and heavy steam-using machinery of all kinds, as well as electric-light machinery-makers, are having more work coming in upon them this September than they have at any time in their history. This is not exceptional. The smaller establishments employing from 100 to 200 or 300 hands are about as well fixed. There are establishments in the New England States, and in New York, Pennsylvania and Ohio, which have from two to six months' work ahead guaranteed to-day. There are enterprises likely to be undertaken next year involving the outlay of millions of money which will make an enormous amount of work for those large establishments, which will create a heavy demand for iron and for all the material they consume. The enlargement of capacity in a number of these works is, therefore, contemplated, but there will not be anything done until every element of uncertainty is removed. Several large mechanical establishments are also projected in the South. There are a number of establishments to be built for the manufacturer of railway material and appliances. The States of Georgia and Alabama will be favored; Tennessee comes third. Northern capital will also embark very largely in iron-making in one or two of these States. The makers of saw-mill machinery have a great deal of work promised for this winter. Those who have been investigating this industry say that there will be something like a boom in saw-mill and planing-mill building set in. The room for this enterprise has been made by the construction of railroads in the South which have opened up valuable timber-territory. There is an improving demand for all kinds of Southern hardwoods, as well as yellow-pine and North Carolina pine. Some millmen are quick to recognize an opportunity when it presents itself, besides they are seeking an eligible situation where fuel and labor are cheapest. The means for transportation are abundant. The best authorities on lumber state that a heavy increase will take place next year in the shipment of all kinds of Southern products to Northern markets, including iron and steel. An arrangement is now being made by which the cost of carrying crude-iron from the interior to Alabama to Georgia ports, and from thence by water to Northern ports will be considerably reduced. This will, of course, jeopardize in a measure the crude iron interests of Pennsylvania. At this time Pennsylvania iron-making is barely paying, and any fresh competition will necessarily interfere with the profitable operation of a good many of the older style of furnaces. Pennsylvania furnace-managers have been endeavoring to guard against this long expected danger by making improvements, but high-priced fuel and stiff railroad freights are not to be gotten over, and the Southern managers will not be slow to seize the advantage offered.

The year 1889 will be a shop-building year as well as a year of building small houses in all the region of country where the new industries are penetrating and planting themselves. Several syndicates have been organized within the past few months to conduct industrial operations and manufacturing enterprises in the newer sections of the country on an enormous scale. As evidence of this, reference may be made to a company controlling millions of capital, which is to be invested in the construction of short-line railroads and manufacturing establishments of every possible character. This individual scheme may be or may not be seriously contemplated, but there are a number of syndicates controlling capital running up into the millions which will be employed in all kinds of operations in the West and South upon a large scale. As has been frequently noted, the construction of short lines of railroads will engage the attention of railroad managers next year for the purpose of holding out for an enhanced value on the land through which they pass. The competitor of the Standard Oil Company has already taken shape, with a claimed capital of $30,000,000. Even if its claims are not what they appear to be, they truthfully indicate a tendency in our commercial and manufacturing circles that is to form powerful combinations or syndicates for operating on a large scale. The pioneers have already shown what can be done and organized capital will now march in solid battalions to take possession of the extraordinary opportunities which are presented West of the Ohio River and South of the Mississippi. Trade conditions continue sound. There is no increase in commercial failures. A higher order of financial dealing is now in control of most of the industries and commercial houses. The commercial agencies are better managed than ever and are rendering very valuable service to trade and patrons. Reports now possess more value than they have had when the necessity for exactness was not so generally recognized. A rapid expansion of trade has obliged the leading agencies to employ more reliable agents to collect sound information. The business men now think they can rely much more safely upon the reports than ten years ago. The mining interests are in profitable operation. The artificial fuel does not interfere apparently with the use of coal. Since the first of July a number of coal-mining operations have been formed for operating in the regions west of the Mississippi; namely, in the Northwest and Southwest. Orders for machinery, coal-cars and all the necessary appliances have been placed within the past month or two. A very rapid developing of the coal-producing capacity in these sections may be relied upon. Coal is in urgent need, as freight rates from the older sources of supply interfere with manufacturing requirements.

S. J. Parkhill & Co., Printers, Boston.